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Professor Rogers on English Coal.

This distinguished American *savant*, who has just accepted a chair in the University of Glasgow, Scotland, in writing of the physical power which England derives from the transformation of the latent power of coal into active force, states the following interesting facts:—

"Each acre of a coal seam, four feet in thickness, and yielding one yard net of pure fuel, is equivalent to about 5,000 tuns; and possesses, therefore, a reserve of mechanical strength in its fuel equal to the life-labor of more than 1,600 men. Each square mile of one such single coal bed contains 8,000,000 tuns of fuel; equivalent to 1,000,000 of men laboring through twenty years of their ripe strength. Assuming, for calculation, that 10,000,000 tuns out of the present annual products of the British coal mines, (namely, 65,000,000,) are applied to the production of mechanical power, then England annually summons to her aid an army of 3,300,000 fresh men pledged to exert their fullest strength through twenty years. Her actual annual expenditure of power then is represented by 66,000,000 of able-bodied laborers. The latent strength resident in the whole coal product of the kingdom may, by the same process, be calculated at more than 400,000,000 of strong men, or more than double the number of the adult males now upon the globe."

Letters with Diagrams.

We often receive letters containing sketches of machines, respecting which, information is asked by our correspondents; many of these—in fact the most of them—are written with the description on the first page and the diagram inside. It is difficult to read and understand such letters, because a leaf has to be turned over to find every *letter of reference*. Correspondents will save us much trouble, and enable us to understand their sketches better and more rapidly, if they will write the description on one *inside* page, and make the diagrams on the opposite one, or on a separate sheet. Such letters have but to be opened out and placed before us, to enable us to read the descriptions and examine the sketches with facility and without confusion.

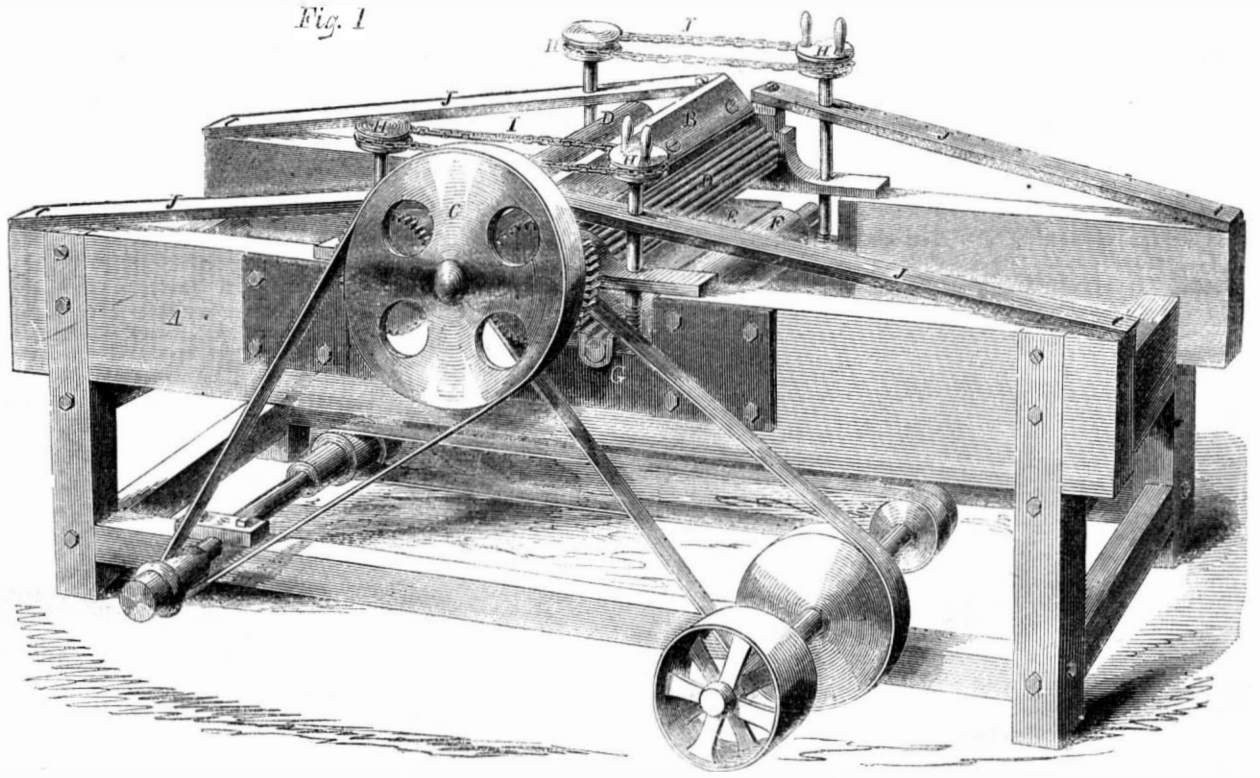
New Decolorizing Agent.

M. Mene, a French chemist, has just discovered that hydrate of alumina, prepared by decomposing alum with carbonate of soda, is a perfect substitute for animal charcoal in the decolorizing of liquids. He has tried it on sugars, sirups and molasses, and it has given every satisfaction; and after having been used once, it can be washed and re-prepared.

It has also the great advantage of cleanliness; and it is more pleasant to our fancy to know that our sugar has been clarified with alumina, than with burnt blood, and similar animal products.

DARBY & YOUNG'S PLANING MACHINE.

Fig. 1



This improvement in planing machines has especial reference to the shape of the bed and bed rollers, and its construction will be understood by reference to the engravings and the following description:—

Fig. 1 is a perspective view of the whole, and Figs. 2, 3 and 4 will be hereafter described. In Fig. 1, A is the frame; B is the planer, and C the driving wheel of the feed

Fig. 2

Fig. 3

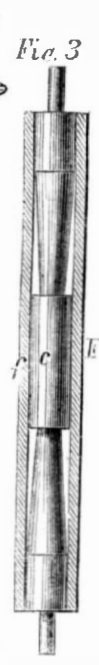
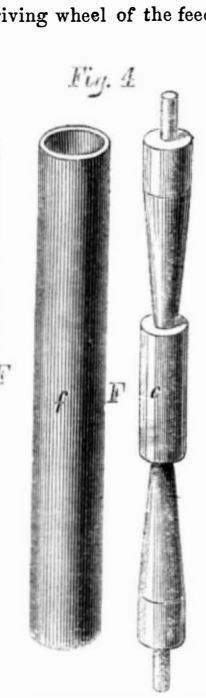


Fig. 4



motion; D D are the feed and delivering rollers, ; E is the bed, and F the roller to render the passage of the stuff easy from the bed. The bed is supported in two movable pieces, G, one on each side, which can be raised or lowered to accommodate the thickness of the stuff by the screws, H H H H, and chains, I. J J J J are slats having their outer ends attached to springs, so that they keep a pressure on the feed rollers. Planing machines are generally open to the objection that they will only smooth the kind of work for which they are specially constructed, and are not capable of being altered to various applications; in fact, they are not like the majority of machines now manufactured—perfect specimens of *multum-in-parvos*—capable of doing a great number of things with the one piece of mechanism. Now, the great advantage of this machine is, that it can be made to plane either flat pieces of wood or beveled, as will be seen by reference to Fig. 2, which is a vertical section of the bed plate, E; the flat or horizontal top, *e*, can be removed by loosening the screws, *a a*, when the beveled part, *b*, will form the bed, thus placing the stuff at an angle with the planer, B, and will allow two beveled slats to be planed at once. Fig. 3 is a section of the bed roller, F, which consists of an outer case, *f*, that can be slid off, leaving a corresponding shaped roller, *c*, to the bed plate. Fig. 4 shows these two separate.

It was patented July 28, 1857, and further particulars may be obtained from the inventors and patentees, Geo. Darby, of Richmond, Va., or J. E. Young, of Augusta, Me.

How Wine is Made in California.

We have on previous occasions expatiated on the capabilities of the Golden State as a wine-producing country, and we now transcribe from the Los Angelos *Star* a description of the method of manufacturing this beverage in that city from native grapes:—

The first operation in the process of wine making, after the grapes arrive at the mill, is to shell them off the stems; six men are employed in this operation. The grapes, as they come from the vineyard, are thrown upon coarse wire sieves, which are firmly set at an angle of about forty degrees, above and around the mill. Wooden forks are used to shell the grapes, which, as they are detached and moved about on the sieves, fall through into a hopper, which conveys them to the mill. The stems remain upon the sieves, and are removed by hand.

The mill is formed by two horizontal wooden cylinders, about three feet long, and ten inches or a foot in diameter. These are kept in motion by means of a crank, which is easily turned by one man. The mashed grapes fall from the cylinders into a large shallow tank, from which the juice rapidly flows off, and passing through a couple of sieves, to separate any skins or seeds which flow along with it, is raised by a pump and conducted to the fermenting tubs. These vessels hold from eight to fifteen hundred gallons each. The juice in this state, fermented without the skins or pulp, produces white wine. The skins and pulp, together with the seeds, are removed to other tubs, where, during the process of fermentation, coloring matter is extracted, forming red wine.

To give a high color to the wine, the pomace, as it rises to the surface during fermentation, is frequently broken up and stirred into the wine. This is only practiced when the juice, pulp, and skins are fermented together in the same vessel.

Six men are kept constantly employed in shelling the grapes from the stems, and such is the ease and rapidity with which they are ground, that the mill is kept waiting nearly one-half of the time. After the mash is sufficiently fermented, which occupies from ten to eighteen days, the wine is drawn off into pipes, and the pomace is then taken to the press, where it is subjected to the pressure produced by a five-inch screw. Surrounding and attached to this screw is a drum of about ten feet in diameter; a rope is wound upon this drum, and one end carried to a capstan, when the power of two or more men is applied to long bars, which produce a leverage of no insignificant amount. Five men are employed in this branch of the operation.

The daily product of wine is two thousand gallons, and the estimated product of the present vintage is eighty thousand gallons.

Notwithstanding the pressure which has been applied to force the bruised grape to yield its spirit, yet so endurable are the exhilirating qualities of this fruit that the pomace still contains enough to tempt the cupidity of man; so the pomace is sold to distillers, at the rate of five dollars for the pomace from which one thousand gallons of wine have been made. The pomace is mixed with water, and then subjected to distillation, and the result is a good distillation of pure grape brandy.

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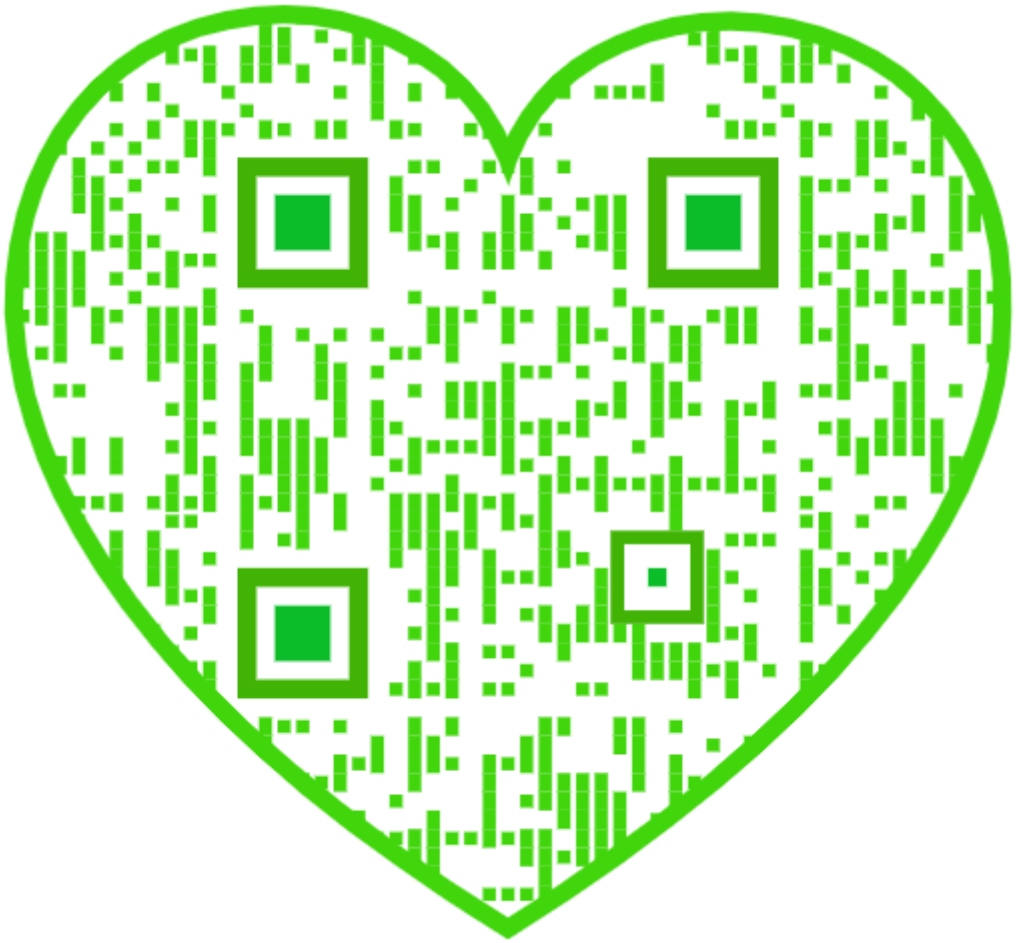

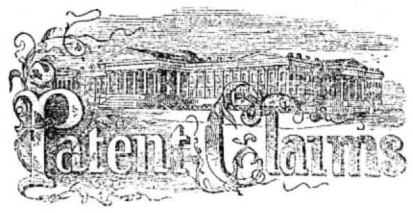

Issued from the United States Patent Office

FOR THE WEEK ENDING DECEMBER 1, 1857.

[*Reported officially for the Scientific American.*]

KNITTING MACHINES—Walter Aiken, of Franklin, N. H. : I do not claim the plates, L, between the needles, when fastened to a movable bar, as shown and described in John Nesmith's patent, of July 29, 1856.

Neither do I claim a rocker bar, when made and arranged as described in the patent of Nesmith, but only when constructed and arranged as hereafter claimed.

I claim a set or series of traversing needles, arranged to slide independent of each other, in combination with the stationary plates, K, between the needles, to hold the fabric knit, when the stitches are formed, constructed, and operating as described.

I claim a vibrating traversing yarn carrier, operated so as to hold the yarn over or near the selvage while the carrier is vibrated so as to change the latch opener, as described.

I claim a double-edged latch opener, in combination with a vibrating yarn carrier, operated so as to change the latch opener, as described.

I claim the stationary rocker or supporting bar, F, so constructed and arranged as to support the outer ends of the needles beyond the fabric and under the latch opener, as described.

PLOWS—Joseph Banks, of Dadeville, Ala. : I claim the arrangement of the double branched colter, I, so that its rear branch rests on the point or share, and its forward branch supports the under side of said point, in combination with the vertical and forward, and rear adjustments of the colter in the beam, in the manner and for the purpose specified.

SPEED INDICATOR—James M. Benckert, of Philadelphia, Pa. : I distinctly disclaim the employment of weighted arms, assisted by springs in governors or speed indicators for I am well aware that they are old.

But I claim the arrangement of the double-threaded cam, F, segments, E, and swivel arm, G, as and for the purposes set forth.

[A description of this will be found on page 107.]

SURVEYING LEVEL—Christopher Becker, of Brooklyn, N. Y. ; I claim first, The constructing of the telescope with square surfaces, a a, resting upon small points or surfaces upon the supports, and attached to the same in the manner and for the purposes described.

Second, I claim the arrangement, construction, and manner of operating the spider threads by one screw only, as described.

Third, I claim the arrangement of the set screws, S, acting directly upon and square to the axis of the instrument, in the manner specified.

Fourth, I claim the arrangement and construction of the micrometer, and tangent screws, so as to prevent any dead movement, in the manner described.

COMPOSITION FUEL—Elizabeth Bellinger, of Mohawk, N. Y. : I do not confine myself to the precise proportions of the several ingredients specified.

But I claim the inflammable composition formed by the union of kawri gum, rosin and sawdust, in suitable proportions, to give it the character specified.

[For description of this invention, refer to another page.]

SEEDING MACHINES—Jarvis Case, of Springfield, Ill. : I claim so combining with the drivers' seat, H, a marker, having in its arm a hinged brace, or its equivalent, as that said driver may from his seat, turn over or reverse said marker, suspend it to the machine whilst turning around, and drop it into its working position without leaving his seat on the machine, as set forth, and for the purposes explained.

HAY RAKES—L. A. C. Brown, of Sparta, Ill. : I do not claim, broadly, a rake so arranged as to swing, and allow its teeth to be elevated, that it may deliver its load, for rakes thus arranged have been previously used.

But I claim operating or raising the rake through the medium of the lever, I, provided with the pin, i, the wheel, B′, and the curved bar, j, arranged substantially as described.

[This invention consists in a novel arrangement of the rake head, by which it may be elevated at proper intervals to discharge its load. It is operated by one of the wheels of the machine.]

SEWING MACHINES—Joel Chase, of New York City : I claim the combination of the lever, G, when hung on an axis in the rock shaft, with the lever, I, when the motion thereof is limited by the stops in the manner set forth, for the purpose of imparting the feed motion to the needle.

EXTENSION TABLES—Charles B. Clark, of Mount Pleasant, Iowa : I do not claim, broadly, the employment or use of folding rails applied to extension tables, irrespective of the arrangement shown.

Neither do I claim the employment or use of fixed side pieces, irrespective of the peculiar arrangement as shown and described, for said parts have been previously used.

But I claim having the jointed or folding side rails, B B′, made of unequal lengths, and applied to the end pieces, A A′, as shown in the drawings, for the purpose set forth.

[The object of this invention is to obtain a strong and firm extension table when in an extended or closed state, and one that may be closed or opened with facility.]

REGULATING THE ACTION OF A FLY WHEEL—Abram C. Frederick, of Clarendon, N. Y. : I claim attaching a fly wheel to the machinery upon which it is intended to concentrate its force by the medium of a friction brake, as and for the purpose set forth.

SEEDING MACHINES—Jacob Geiss and Jacob Brosius, of Belleville, Ill. : We are aware that perforated slides, moving rectilinearly in opposite directions have been previously used for distributing seed; and we are also aware that slides to vary the orifices of seed receptacles or cells have been previously used.

We therefore do not claim broadly, and irrespective of construction and arrangement, such devices.

But we claim the employment or use of the two sector plates, B C, constructed as shown, viz., one being provided with an opening, f, and the other with a recess or seed receptacle, g′, and ledge, i, the plates being fitted on a common axis, b, and operated through the medium of the eccentrics, d d, and the connecting rods, D D, attached to the arms, c c, at the desired points, as and for the purpose set forth.

[This seed planter will not choke in its distributing device, nor will the seed drop through when the machine is not in operation.]

GRAIN SEPARATORS—John R. Moffitt, of St. Louis, Mo. : I claim the construction and arrangement, substantially as described, of the rotary beater, A, within the apron, in combination with the falling sections, B′, operating in the manner and for the purposes set forth.

RAKE FOR HARVESTERS—C. P. Gronberg, of Geneva, Ill. : I claim the guide rods, b and c, and swinging frame, d, carrying the stationary fork, F, in combination with the levers, 1 and n, and traveling fork H, the whole being constructed, operated and arranged in relation to each other, in the manner substantially as set forth.

COOKING STOVES—Rensselaer D. Granger, of Philadelphia, Pa. : I do not desire to claim exclusively the dividing of the lower flue to the products of combustion.

But I claim as an improvement in the stove for which a patent was granted to me on the 1st of March, 1848, forming underneath the oven a chamber through which a current of cold air, entering at the rear of the stove, may pass into the space between the back of the fireplace, and front of the oven, when the said chamber serves the purpose of dividing and dispersing the products of combustion as they pass through the lower flue to the chimney.

PILE FOR ROLLING BEAMS—John Griffen, of Phoenixville, Pa. : I claim the manufacture of wrought iron I or T girders and bars, by forming the pile of grooved pieces, in combination with the intermediate webbing, arranged and combined in the manner substantially as described.

CULTIVATORS—Joshua Gibbs, of Newark, Ohio : I am aware that adjustable and reversible shares have been heretofore used. I do not claim, broadly, to be the inventor of them.

I especially disclaim whatever there may be in my device which resembles any portion of J. L. Eastman's patent, June 30, 1836, R. H. Springstead's patent, February 12, 1845, and A. Leland's patent, January 2, 1849.

But I claim a cultivator constructed as described, viz., having its frame, A, made of wrought iron in the form shown, with metallic lipped plates, j, made to slide longitudinally on the frame, the share, C, of the form shown, attached to the plates, j, by bolts m, and capable of being adjusted and reversed, all as specified.

[This cultivator provides one which is extremely durable, easily kept in repair, and one that may be adapted to all purposes or modes of culture practiced for "hoed" crops.]

REVOLVING BOTTLE CASTERS—Edward Gleason, of Dorchester, Mass. : I do not claim, separately and broadly, the revolving doors, E, nor the revolving body, B.

But I claim the combination of the pinions, h h h, each moving a caster door and cruet, and the wheel, F, with the pinion, e′, of the rod or arbor, f, the said pinion, e′, gearing into a segment rack, d′, in the wheel F, as set forth, so that when this combination is actuated through the knob, i, the castor, cruets and doors, to which they are attached, may be rotated independently of the rotation of the body, B, of the castor.

[This is an improvement on a former patent, and is a very good castor.]

BALANCE IRON FOR MILL STONES—Joseph H. Glover, of Skegg's Creek, Ky. : I am aware that the bails of mill stones have been provided with blocks which were interposed between the point of the mill spindle and the interior surface of the bail.

But to the best of my knowledge and belief it is new to render such blocks adjustable by means of screws, whereby the stone may at all times be readily balanced, and a better operation of the parts be thus secured, and the quality of the flour improved.

In the patent of E. R. Benton, March 31, 1840, a block is interposed between the point of the spindle and the bail. I disclaim everything contained in the patent of said Benton which resembles my improvement.

I claim the block, B, when made adjustable from the exterior of the bail by means of screws, d, as and for the purposes set forth.

[For a further description of this, see another column.]

LONG TRUNKS FOR CLEANING COTTON—Isaac Hayden, of Lawrence, Mass. : I claim covering the partitions of an elongated trunk or box for cleaning cotton and other fibrous substances, with woven wire, having the scores formed by the weft, crossing the warp of said wire screen filled with metal or cement, the whole combined in the manner and for the purposes set forth.

DUMPING CAR—George W. Hart, of Aurora, Ind. : I claim in combination with the reel, J, the slatted folding floor, 1 2 3 4 5 6, supported and operated in the manner set forth.

FINGER BARS FOR HARVESTERS—J. M. Long, Peter Black and Robert Allstatter, of Hamilton, Ohio : We expressly disclaim the formation of finger bars of a single sheet of metal, rounded in front, and with the fingers passing through holes in the said rounded portion, as patented by Moore & Patch, Nov. 25, 1856.

But we claim the combination of the wrought metallic plates, P P′, with the reciprocating cutter bar, A, cutters, C, and square-shanked fingers B, said parts being constructed and arranged in relation to each other for joint operation, in the manner shown and described for the purposes set forth.

CANE PLANTERS—Tobias Marcus, of New York City : I claim the adjustable mold board, F, arranged and operated by means of the circular slide, M, in combination with the adjustable beam, A, and socket, B, secured by braces, C and N, in the manner and for the purpose as described and shown in the drawings and specifications.

BEE HIVES—Henry M. McClellan, of York, Pa. : I claim the combination of the sections, A B C, connected as shown with the rotating doors, D, agitating and regulating wires, E, ventilating tubes, F, and tolling and feeding cups G, the said parts being constructed and arranged in relation to each other in the manner and for the purposes described.

MACHINES FOR ROLLING DOUGH—John McCollum, of New York City; I claim the combination with rollers, suitable for rolling dough, or similar substances, of an endless feeding band or platform, moving on pulleys or friction rollers, as required, the band not being geared to the rollers in any way, and being free to take its motion from the dough.

EGG BEATERS—Harvey Miller, of Cincinnati, Ohio : I do not claim the ratchet bar or revolving shaft and beaters.

But I claim the frame, A B, having a ratchet bar, g, and revolving beater, c d, in combination with the jar or can, as described, for the purposes set forth.

LIFTING JACKS—David L. Miller, of Madison, N. J. : I do not claim to be the inventor of the individual or separate parts of the described screw jack.

But I claim the adjustable cylinder, B, shoe, C, inner cylinder or adjustable standard, D, in combination with the main or lifting screw, A, and gearing, E and F, arranged and operated as described and shown in the drawings.

MACHINE FOR THREADING BOLTS—Wm. Sellers, of Philadelphia, Pa. : I claim the use of a die box and cams, substantially as described, when these are so arranged as to be capable of revolving about a common center at different velocities for the purpose of opening or closing the dies.

I claim arranging the cams so as to leave open spaces between them, substantially as described, in combination with the die box and dies as described, to facilitate the changing of the dies.

I also claim the mode of attaching the tap-holder to the revolving die-box, substantially as described.

PLOWS—W. W. Skinner, of Davenport, Iowa : I do not claim the rolling cutter, the use of the front wheels, the lever, beam, and plowshare, the rod mold board, or any of the described parts, except as shown and set forth.

But I claim the mold board, B E, B E, B E, friction roller, M, rotary cutter, a, wheels, p, adjusting lever, T, and seat, Z, when combined and arranged and operated in the manner and for the purpose set forth.

CULTIVATORS—A. Q. Withers, of Redbanks, Miss. : I claim hanging the stock bars, G G, to the frame by hinge joints, so as to give them a vibratory play sidewise, substantially in the manner and for the purpose specified.

GAS LIGHTING LANTERNS—Abel Wilson, of Philadelphia, Pa. : I wish it to be understood that although I prefer three corrugated cones, I do not desire to confine myself to that precise number or form of cones, as one cone only will serve the desired purpose, and as the cones may be made plain instead of corrugated.

But what I claim is surmounting the body or casing of the lantern with its hollow perforated cone, C, in combination with the cone, D, when the same are arranged and constructed, substantially in the manner set forth, and for the purpose specified.

CLOTHES WRINGER—Riley Smith, of Towanda, Pa.: I am fully aware clothes have been wrung in a cloth, bag or net, by applying the power that twists said cloth, bag or net, at one or both of their ends. This I do not claim—

But I claim, in combination with the cloth, bag, or net that contains the clothes that are to be wrung, a twisting or wringing device, composed of a cord, i, and the lever, Z, when said cord is united to or winds around the clothes receiver, and the lever can slide thereon, so as to apply the greatest pressure nearer the center of the clothes receptacle, and moved where most desired or required, and as set forth.

SAUSAGE MACHINES—W. Sniff, of Fultonham, Ohio : I am aware that teeth or knives have been attached to a rotating drum or cylinder, and stationary knives or cutters have been used in connection therewith, and placed within a suitable box, I therefore do not claim broadly and separately the cutting device shown.

Nor do I claim broadly the employment of a plunger working within a cylinder or trunk for stuffing cases with sausage meat, for such devices are in common use, although arranged differently from that shown and described.

But I claim the stuffing device formed of the cylindrical trunk, H, provided with slots, k k′, and the plunger, J, attached to the rod, K, as shown, when the above parts are arranged relatively with the box, B, for the cutting device, so that the within described parts may operate conjointly, as and for the purpose set forth.

[The object of this invention is to make sausages direct from the meat at one operation. The machine is a combination of a cutting and stuffing device, both being operated conjointly.]

CLASPS FOR METALLIC HOOPS—J. R. Speer, of Pittsburg, Pa. : I claim the use of a hollow clasp, or fastening for metallic bands, of the shape shown in the drawings, through which the ends of the hoop are passed in opposite directions, and the projecting extremeties bent over the clasp, and inserted into an aperture in the middle of the clasp, in the manner before described.

PHOTOGRAPHIC PLATE HOLDER—John Stock, of New York City : I claim, 1st, A plate holder for photographic or other purposes, with movable pieces, F, to support the glass or plate, constructed in the manner specified, and for the purpose of accommodating different sizes of plates.

Second, I claim the plates, H and I, acted upon by springs for the purpose of keeping the pieces, F F, in any desired position.

PROPELLING CARS AND CARRIAGES BY HORSE POWER—H. G. Vanderwerken, of Greenbush, N. Y. : I claim, first, So arranging the endless belt platform on a frame, independent of the truck, that the return part or underside of the belt may rest upon, and gear into pinions on one or both axles and thus cause them to rotate in the direction in which the horse is apparently walking without the use of any intermediate gearing, in the manner substantially as specified.

Second, I claim supporting the endless belt platform on the axles of the truck, in such manner that when the horse is at work, it will assume an inclined position, and when at rest a horizontal one, in the manner and for the purposes set forth.

MACHINE FOR MOLDING SHELLS—W. H. Ward, of Auburn, N. Y. : I claim, first, Adjusting the semi-flasks to the pattern, to the molding bed and each other, by means of a circular V-shaped guides, constructed and arranged as described.

Second, The combination of the V-guides, with the ribs, g g′, and the recesses, n o′, in the base of the flask, for adjusting the pouring tube to the gate pattern.

Third, The combination of the adjusting screws, d, in the base of the pattern, with the adjustable eccentric rod, arranged as described, for adjusting and raising the pattern, so that its center will coincide with the plane of the molding plate.

Fourth, The combination of the core pin and adjusting flange, e, with the core pin holder, and adjusting recess, the whole arranged in the manner and for the purpose set forth.

PLOWS—R. B. Winston, of Richmond, Va. : I claim the construction of the beam, as described, in combination with the land side, when the said beam is cast in one piece with the land side, in the manner described, and for the purpose set forth.

DRIVING BOX FOR LOCOMOTIVES—J. E. Wootten, of Philadelphia, Pa. : I claim the adjusting plate, C, or its equivalent, in combination with the divided journal box, B B, as described, for the purpose and in the manner set forth.

CLEANING THE TOP CARDS OF CARDING MACHINES—Horace Woodman, of Biddeford, Me. : I do not claim the use of corrugated arches, affixed to the card frame, as a means of moving the cleanser frame, the same having been claimed by me in my former Letters Patent.

Nor do I claim as new any device or machinery which is substantially described in my former Letters Patent.

But I claim, first, The peculiar construction and arrangement of fixed corrugated arches, R and R′, and traversing corrugated arches, G and G′, with gears, L and L′, operating in the manner and for the purposes specified.

Second, I claim the peculiar construction and arrangement of tangent pinion, J, with section of teeth, o o, and cavities, 9 and 10, at its ends, operating in combination with the plane face of gear, Y, in the manner and for the purposes specified.

Third, I claim the said jointed lifters, constructed and operated as specified.

MOWING MACHINES—Ephraim Ball, of Canton, O., assignor to himself and John Butter, of Buffalo, N. Y. ; I claim the combination of the short curved brace rod, R, with the rigid and broad angle attachment of the inclined bar, 2, to the finger bar, P, the whole arranged for joint operation, substantially as and for the purpose above set forth.

GOLD AND SILVER ORES—Joseph A. Bertola, (assignor to himself and John Stagg) of New York City : I claim the use of pyroligneous or other vegetable acids having similar chemical action, in treating gold or silver ores or "tailings" preparatory to amalgamation, substantially as described.

FASTENING HARNESS TRACES—Joseph W. Briggs, of Cleveland, O., assignor to J. A. Lazell, of Plainsville, O. : I do not claim as my invention the eccentric which presses the trace against curvatures in the bed plate; neither do I lay any claim to a cam lever in any way.

But I claim the raised or elevated parts of the trace, C C C C, when used in combination with a cam lever as set forth.

MACHINE FOR SAWING BEVELED CURVES—John C. Hintz, of Cincinnati, O. : I claim, first, The cranes, D D′, with the traversing and turning rests, E F, E′ F′, communicating by means substantially as described, with a winch, g, or its equivalent, convenient to the hand of the sawyer in the described combination with a scroll saw and feed roller for the purpose set forth.

Second, I claim in this connection the rest, J j, constructed and operated substantially as and for the purposes set forth.

CLEANING GAS RETORTS—S. W. Carpenter (assignor to Wm. W. Woodworth) of Yonkers, N. Y. : I do not claim as my invention the principle of the use of steam or stame as a cleanser of gas apparatus.

But I claim the method or process of the introduction of water directly into the heated retort (the charge being drawn or exhausted) there to be converted into steam or stame, free to unite with and remove the carbonaceous or other deposit contained in the retort or pipes, substantially in the manner set forth.

PRINTING PRESS—John Henry, of Vevay, Ind. : I claim, first, The frisket carriage, M, attached to the frame, D, as shown and used in connection with the inclined bars or guides, j j, whereby said frisket carriage and its frisket is elevated at the termination of the outward stroke of the frame, so that a blank sheet may be readily and conveniently adjusted on the frisket or a printed sheet be discharged therefrom, as described.

Second, I claim the frisket, N, when used for the purpose of discharging or delivering a printed sheet as set forth.

Third, I claim the combination of the pressure cylinder, J, and frame, D, when said cylinder is operated automatically by the wedges, L L, and spring, Q, as shown so as to be depressed at the proper time, and give the necessary impression to the sheet, and also be thrown up free from the sheet after the impression has been given, as described.

Fourth, I claim the arrangement of the feed board, B, and fly board, C, when arranged as shown, so that said boards are made adjustable and capable of being removed at one side, so as to render the working parts of the press accessible, as described.

[A description of this invention will be found on another page.]

CORN HARVESTERS—Adam Humberger, of Somerset, O. : I am aware that shafts, with revolving arms and knives have been used in connection with guards for conducting cut stalks upon a platform or table. Therefore, I do not claim these devices as heretofore employed, neither do I claim the carrying table, P, when moved with its supporting frame.

But I claim, first, The large shafts, or rollers, E E, turning upon the fixed axle, D D, and having radial arms, L L and H H, with knives, I I, in combination with the guards, M M, G G and F F, and knives, K K, for the purpose of cutting the stalks, and securely conducting them across the table, B, to the binding table, P, as set forth.

Second, I claim the table, P, when movable upon its supporting frame, in combination with lever, U, and clamps, R R, for binding and shacking the corn, as set forth.

STANDARD FOR SEATS—John Irwin, of Philadelphia, Pa. : I claim the combination of the screw and spring, forming an improvement in adjustable and elastic standards for seats, as set forth.

GANG PLOWS—E. C. Jones, of Pittsburg, Pa. ; I claim, first, The arrangement of the hinged beams, C C, and springs, D D′, or any equivalent device therefor, when constructed and operating substantially as described.

Second, The coupling of the plows to a front bar, G, and back bar, H, as described, which bars can be roised or lowered by means of the rack rods, E E′, and segment levers, F F, or any equivalent means in their place, substantially in the manner and for the purpose set forth.

PLOWS—John Lane, of Lockport, Ill. : I claim first, The rigid foundation or frame, when constructed with a taper point and inclined flanch which projects nearly at right angles from the landside of the plow underneath the mold board and lay for use, in combination with a yielding mold board, a yielding steel lay which has a complete taper socket at its point, and with a steel landside facing substantially as and for the purpose set forth.

[This improvement will be found described in another column.]

PEDAL BASE FOR MELODEONS, &c.—G. W. Lane and Wm. N. Manning, of Rockport, Mass. : We claim, first, The arrangement of the valves, the reeds and the air chamber of the pedal base upon the pedal board, or otherwise in an equivalent manner arranging the same behind the pedals, so that the whole of the pedal base is rendered portable, and can be attached to any instrument by simply connecting its air chamber by a pipe with the bellows of the instrument, substantially as described.

Second, The arrangement of the valves, with their lever-like stems, inclined planes, and springs, substantially as described, for the purpose of combining the valves with the pedals to be operated thereby.

[This pedal base is portable, and can be applied to any melodeon already in use, or one constructed on purpose.] .

SEED PLANTERS—Daniel B. Neal, of Mount Gilead, Ohio : I do not claim that any of the members of my machine are new.

Nor do I claim to have been the first who has dropped the grain at pleasure of the operator in a power planter.

But I claim the peculiar arrangement of handle, H, rod, J, bars, D M and C, slides, i i, and lever, c, when used in the manner and for the purpose described.

ROCK DRILLS—Joseph E. Nesen, of New York City : I am aware that rock drills have been previously mounted so as to be capable of being adjusted in one direction only, viz., in a vertical plane, longitudinal with the frame on which they are placed; and I am also aware that means similar to that described, has been employed for effecting the purpose. The ratchet, Q, and pawls, R R, have also been used.

I therefore do not claim the ratchet, Q, and pawls, R R.

Nor do I claim the slotted semi-circular plates, M M, and their connection with the frame N, as shown, when separately considered.

Nor do I claim the wiper or tappet, L.

But I claim attaching the semi-circular slotted plates, M M, and frame, N, to the adjustable frame, E, fitted to the uprights, c c, of the frame, A, as shown, and for the purpose set forth.

[In another part of our paper a description of this will be found.]

LIME KILNS—Jacob Newkirk, of Factoryville, N. Y. : I claim instead of taking the upper fire flues directly from the fire chamber into the interior of the kiln, the carrying a portion of the flame and heat up into the arch, and thence by the upper flues into the stack or interior of the kiln, by which means I economise and make a better distribution of the heat, and better draft than when it is taken alone and immediately from the fire chamber, as set forth.

SEEDING MACHINES—David O. Paige and John Clary, of Dayton, Ohio : We are aware that pins and flanches have been attached to rotating drums or cylinders, for the purpose of agitating the seed in the seed boxes of seeding machines, and preventing the choking and clogging of the same.

But we are not aware that spiral flanches placed in reverse positions on drums or cylinders, so as to give a reciprocating or vibratory movement to the seed, and thereby effecting a greater agitation than usual, have been used.

We do not claim, therefore, broadly, and irrespective of the arrangement shown, the employment or use of spiral flanches or pins placed in spiral rows on drums or cylinders, for they have been previously used.

But we claim the spiral flanches, c d, placed in reverse positions on the rotating cylinders, D D, within the hopper, A, substantially as and for the purpose set forth.

[This is a very good seed planter, and its parts are well arranged.]

COTTON AND HAY PRESSES—George W. Penniston, of North Vernon, Ind. : I claim connecting each of the ropes which operates the toggle to which the press and draw back the plunger to separate, and independent capstan barrels, arranged to turn freely on the same

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shaft, provided with a device to lock either of them to said shaft when desired, as described, so as to save three-fourths of the time heretofore required to retract the press, and the time and labor of reversing the horse twice for each bale pressed.

RAILROAD CAR WHEELS—Michael Phelan, of Bridgewater, Pa. : I claim the curved projections on the disk of four reversed sines, forming arms, in combination with braces and a series of arches, so arranged on the disk or front plate of four reversed sines, so as to give a uniform spring to all parts of the casting in cooling, relieving the wheel from all contingent strain, and giving the greatest possible strength for the weight of iron used, and for the application of said curved projections and combination of arch s and braces, without a front plate in casting car wheels, as described.

CORN PLANTERS—Bradley L. Prime, of Hamilton, Ohio : I claim the yielding partitions, c, of the hopper, constructed, arranged and operating as and for the purpose set forth, in combination with the secondary projections, n n′ n″, of the cam, E, the whole operating as described.

CORN HARVESTERS—John H. Ribbe, of Somerset, Ohio : I claim the combination af the bed, f, and arms, k l, with the movable carriage, C, or its equivalent, so as to receive the cut product and deposit the same, as described.

I also claim the re-entrant reel, in combination with the receiving apparatus, as described.

MACHINES FOR MAKING BROOMS—Spencer Rowe, of Baltimore, Md. : I claim the employment of the double pawl, operating on the ratchet wheels, c c, and hollow shaft, B, the rock shaft, D, and rods f f, all arranged as described, when in combination with the guide, E, and friction spools, G, and bobbin, F, for the purpose of manufacturing corn brooms in a superior manner.

RIDING SADDLES—Joseph Rudisill, of Natchez, Miss. : I do not claim a spring seat saddle, broadly.

Neither do I claim having the foundation of the cantel hinged to the tree, and rendered capable of yielding by a rubber spring, as in the patent of Seth Ward, 1857.

Neither do I claim, broadly, a spring arranged at the head of the tree for assisting in rendering the seat elastic.

But I claim the peculiar arrangement of a series of light flat springs, a a, in a circular line around the upper side of the cantel foundation, B, of the tree, A A, for use in combination with the coiled spring, G, as peculiarly arranged under the head, C, of the tree, said springs being actuated simultaneously by means of the seat, E, and webbing or foundation, D, as and for the purposes set forth.

[This invention is designed to render horseback riding more comfortable and pleasant. It provides a seat which yields to the descent of the weight of the rider upon it, and then instantly assumes its original form as soon as the weight rebounds, or rises off of it, ready for a second descent of the weight upon it, as in pacing and trotting.]

SEED PLANTERS—John Robinson, of Eli, of Sharpstown, Md. : I claim, first, Regulating the quantity of earth deposited over and adjacent to the seed, by means of adjustable stops, d, when used in connection with the curved arms, G′, lifting arms, E, and adjustable strap, I K, in connection with the adjustable coverer, k, the whole constructed and operating as and for the purpose set forth.

Second, The combined arrangement of the vibrating box, I, lifting arm, F, adjustable strap, k, and adjustable stop, d, the whole operating as and for the purpose set forth.

WORKBOXES—Charles C. Schmitt, of New York City : I do not claim separately or apart from the general construction of the box or escritoir, any of the parts described.

But I claim a workbox and escritoir constructed as described, viz., the hinged or folding front side, n, provided with the flap, p, the recesses in the top to receive the writing and sewing implements, the secret drawers, z z and a, concealed by the sliding plate or bottom, t, the whole being arranged or disposed as shown and described, for the purpose of forming a combined workbox and escritoir.

[For a description of this refer to page 107.]

SPREADING LIME AND OTHER FERTILIZERS—Pierpont Seymour, of East Bloomfield, N. Y. : I do not claim the use of the levers, rods, or eccentric or zig-zag wheels whereby I communicate motion from the carriage wheel to the distributing works, as such devices are well known, and in use for various purposes.

But I claim the combination and arrangement of a series of vibratory plates or distributors, d, attached to and working upon the face of an inclined plane or distributing surface, C, by means of the rod, F, or any equivalent connection that will give the required motion to one end of said plates, while another portion is stationary upon the board or plane, in the manner and for the purposes described.

MACHINE BANDING—Charles Lensmann, of Brooklyn, N. Y. : I do not claim the web or the composition separately; neither do I claim broadly saturating webs, woven from fibrous materials with the composition above described.

But I do claim as a new manufacture the machine banding, substantially as before described.

RAILROAD CAR WHEELS—A. B. Latta, of Cincinnati, O. : I claim the wheel constructed, as represented, in its parts, for the purpose of producing a tension stress on the dished wrought iron plates, B B, for binding the rims together, by drawing the plates, B B, apart in the center, and holding them by the ring, g, as represented, and substantially for purposes specified.

KNITTING MACHINES—S. D. Fairbanks, (assignor to himself and C. H. Adams,) of Cohoes, N. Y. : I do not claim a latch regulator, with a point to pass under the latches after they are closed, such as is described and represented in the patent granted to Jonas B. and Herrick Aiken, May 22, 1855; neither do I claim a yarn carrier, in combination with a latch regulator, as described in said patent.

But what I do claim is a latch interceptor, consisting of a bar or arm, arranged in such a position over the needles as to intercept the latches after they are opened or thrown back by the stitches of the fabric knit, and hold them open until the yarn is suppiied to form new stitches, and then allow them to be closed again, substantially as described.

I also claim, in combination with the above described interceptor, the yarn carrier, f, for the purpose of delivering the yarn, substantially as set forth in the specification.

SEWING MACHINES—Geo. Fetter, (assignor to himself and Edward Jones,) of Philadelphia, Pa. ; I do not claim exclusively imparting to the pressure bar a lateral motion from the reciprocating motion of the needle bar.

But I claim the needle bar, H, with its adjustable lever, L, in combination with the slide, I, and its projections, n and j, the whole being arranged for joint operation, substantially in the manner and for the purpose set forth.

CARD PRINTING MACHINE—J. S. Moody, (assignor to T. F. and J. F. Randolph,) of Cincinnati, O. : I claim the arrangement of the arm, c, when provided with the form, d, distributing plate, f, rods, y y, feed plate, S, duct, i, guide plate, 12, spring, J, and lever, h, and these arranged with the levers, R R, and spring, K, when said levers are furnished with ink rolls, m m, and distributing rolls, o, and the whole arranged with the vertical oblong openings in the lower part of the frame, B B, in which the shaft, 10, works to admit of the arm, c, being raised vertically to make an impression by pressing down the end of the lever, h, on the fulcrum, 13, and thus elevating the arm, c, as before stated, the whole thus combined, arranged, constructed, and operated, as represented, in the manner and for the purposes of feeding blank cards to the machine, inking the form, making the impression, and discharging the card from the machine after being printed as specified, and represented in the accompanying drawings.

MACHINES FOR SHEAVING CLOTH—M. D. Whipple, of Charlestown, Mass., assignor to A. B. Ely, of Boston, Mass. : I claim removing the rest, E, away from beneath the sheaving knives, and holding the cloth against the ledger blade by tension, in the manner and for the purpose substantially as set forth.

PAINT VEHICLE—Isaac Gattman, (assignor to himself and Jacob and D. E. Breinig,) of Philadelphia, Pa. ; I do not claim exclusively the use of watery solutions for mixing paints.

But I claim the employment of the alkaline salts of the fatty acids, oleate, margarate, sterate of potash, soda, and like substances in combination with rosin and oil, as a thinner for paints instead of oil, substantially in the manner set forth and for the purpose specified.

RE-ISSUE.

GRAIN AND GRASS HARVESTERS—Wm. H. Seymour (assignor to himself and D. S. Morgan), of Brockport, N. Y. Patent dated Dec. 14, 1852—Ante-dated Oct. 25, 1852 : I claim the combination of the platform, the driving gear, the space between the platform and driving gear for the discharge of gavel, the draught pole and the stand or rest on the platform for the forker, when the same are arranged substantially as described.

GRAIN AND GRASS HARVESTERS—Wm. H. Seymour (assignor to himself and D. S. Morgan), of Brockport, N. Y. Patent dated Dec. 14, 1852—Ante-dated Oct. 25, 1852: I claim the combination with the stand or rest, W, upon the rear side of the platform, for the person who rakes off the grain, and with the platform of a strong rail, r, firmly secured to the outer side of the main frame, and extending thence along the rear side of the platform to support it and the stand for the forker, substantially as set forth.

GRAIN AND GRASS HARVESTERS—Wm. H. Seymour (assignor to himself and D. S. Morgan), of Brockport, N. Y. Patent dated Dec. 14, 1852—Ante-dated Oct 25, 1852 : I claim the method described of protecting the gearing from being injured by the working and twisting of the main frame by mounting the said gearing in an auxiliary metallic frame, constructed and firmly attached to the main frame, as described.

DESIGN.

COOKING STOVE—Elias Young (assignor to Chamberlain & Co.), of Cincinnati, O.

Descriptive Index to Chemical Patents.

An Index to the chemical patents issued by the United States Patent Office during the year 1852. Prepared for the SCIENTIFIC AMERICAN by Dr. D. Breed, solicitor of patents, Washington, D. C. Continued from the SCIENTIFIC AMERICAN of November 21, 1857:

Archil—Prepared by treating lichen *roccellus* with volatile alkali, urine and lime water, in certain proportions: Leon Garosson, June 15, 1852.

Acid—Sulphuric; concentrating of, in leaden vessels to 66° Baume, at a temperature below the boiling point: Carl Hinrichs, September 7.

Baryta and Strontia—Production of sulphur and sulphuric acid from sulphuretted hydrogen evolved in process of manufacturing carbonates: Charles Lennig, March 16.

Beer—Concentrated material for; gum, starch, sugar, &c, from evaporated infusion of grain: Franz G. Rietsch, February 3.

Beer—Use of corn boiled to a jelly, into which malt or rye is then mashed: Frederick Seits, January 20.

Butter—Preserved by use of iodide of potash: Louis De Corn, August 3.

Cement—Hydrate of lime and pulverized resin mixed with cold water: B. S. Welsh, May 18.

Enamel—For brick and iron; mixture of glass, lime, (hydrate or sulphate,) salt, oxyd of iron and water: Dunn and Howes, September 7.

Gutta Percha—Heating to 285° to 430° Fah., then vulcanizing by a hyposulphite alone, or with metallic sulphurets, whiting or magnesia: John Rider, June 1.

Gas—Refrigerated by air. Apparatus: Robert Foulis, October 12.

Gas—Feeding into heated retort, charged with bituminous coal, either oil, coal tar, resin, asphaltum, or other bituminous or carbonaceous matter, in a fluid state, separately or mixed: Henry W. Adams, August 10.

Gas—Use of mixture of wood and fat for generating: Danre, Nichols and Lopez, December 8. France, September 27, 1851.

India Rubber—Juice or milk of tree treated with common salt, to preserve: F. Bronner, September 7.

Iron and Steel—Use of calcined borax and carbonate of ammonia in welding; certain proportions: Boyd C. Leavitt, July 27.

Ivory—Placed at certain angle to bleach in sunlight: Ulysses Pratt, January 6. Antedated July 6, 1851.

Oil—Obtaining paraffine and paraffine oil from bituminous coal: James Young, March 23. England, October 7, 1850.

Oil—Mixture of camphene, benzole, carbonate of potash and glycerine with whale oil: William H. Mason, May 25.

Paints—Treatment of magnesian minerals with mineral acids, for preparing pigments: Heman S. Lucas, November 23.

Paint—Watery solution of sulphate mixed with oil paints: Washington F. Davis, August 17.

Powder—For blasting; chlorate of potash and prussiate of potash: Edward Callow, February 17. England, August 6, 1850.

Soap—Use of ammonia (or carbonate ammonia) with kaolin, or other aluminous earth; composition of: William McCord, July 27.

Soda—Chromate; from ore heated with salt, chloride of potash, or hydrate of lime; jet of steam to expel iron as sesque-chloride; then treat with muriatic acid: John Swindells, December 21. England, November 14, 1850.

Soda—Carbonate; sulphate, heated with carbonaceous materials, and treated with water, carbonic acid, evaporation, &c.: Henry Pemberton, October 19.

Sugar—Use of aluminate of lime with phosphate of alumina, or of lime and phosphoric acid, for clarifying: Oxland and Oxland, July 6. England, May 15, 1851.

Zinc—Metallic; impalpable powder prepared by cooling agency of steam: Henry W. Adams, July 28.

To Avoid Sneezing.

MESSRS. EDITORS: You will agree with me that it is *not* a superstitious notion that sneezing may be an indication of having caught a cold. The wise take it as a premonition to avoid encroaching upon a constitution at present sound; they shut every door, close every window, and even stop every crack through which the air may ooze. Sneezing is the effect of a convulsion of the diaphragm, or muscle separating the chest from the abdomen. The sudden check of the uniform condition of the respirating apparatus brings on sneezing. Therefore, by stopping or changing the cause, the effect is prevented. The air which is inhaled when a fit of sneezing is coming on, if suddenly breathed out, will effectually arrest the sneeze. There are times when sneezing is out of place among persons of good breeding—times when it ought not to break deep silence, as at prayers. J. H. H.

The Purple of Cassius.

This is a color generally used in the glazing of earthenware, glass, porcelain, and enamels. It is one of the most ancient as well as the most beautiful of colors and has rather a scarlet tinge. Chemically it is composed of oxyds of tin, oxyd of gold, and water; and according to slight variations in the amount of either metal various shades of color can be obtained. Various methods have been proposed for its preparation, the best process for obtaining it in a pure state being to take 310 grains of fine gold dissolved in 1550 grains of *aqua regia*, consisting of one part of commercial nitric, and four parts of commercial hydrochloric acid; the solution is evaporated to dryness in a water bath, the residue dissolved in water, filtered and diluted with 20 or 30 ounces of water and placed in contact with granulated tin, the purple precipitate being the desired compound. When freshly precipitated it dissolves in ammonia, but by exposure to the light the solution gradually decomposes, becoming gradually blue and then colorless, but when fused with a glaze on porcelain it is a most durable color. The richness of its tints is evidently due to the presence of the gold, which, causing it to be very expensive, has often been endeavored to be replaced by another metal; and often in experimenting, much richer hues have been observed during certain stages in the oxydation of copper, these however are only evanescent, the color quickly changing to the dead black of cupreous oxyd. We believe that some French chemists are now engaged in searching after a good scarlet or purple for porcelain, from copper, and we hope that they may be successful, as it will greatly aid the progress of the art of decorating the works of the potter's wheel.

Bole Armenia.

This is an earthy mineral found in nearly every part of the world, and has the affix of Armenia, because first brought from that country. It is very friable and varies in color from yellow and brown to red and black, and has a greasy feel. When placed in water it readily absorbs it and, emitting bubbles of air, falls to pieces. Formerly it was much used as a medicine but it has now fallen into disrepute, because the only tonic that there could be in it is due to the presence of oxyd of iron, which is now administered in its pure state. It is also used in Germany as a pigment, and also as a tooth powder.

Speed Indicator and Governor.

J. M. Benckert, of Philadelphia, has patented a machine for the above purposes. It consists in having a series of arms pivoted to a revolving plate, with weights at their outer ends, and their inner ends being connected with gearing. The arms are connected to a gearing cam, which is rotated reciprocally, as the arms, by centrifugal force and springs, are made to recede or approach each other; the cam, as it thus rotates, giving the proper motion to an index, to designate the speed of the machine to which it is attached, and also actuating the throttle valve of a steam engine, or the gate of a water-wheel.

Fire Kindling Composition.

By taking regulated proportions of kauri gum, rosin and alcohol, and allowing them to remain open to the ordinary atmosphere temperature, or to a gentle heat, the gum and rosin will be dissolved and amalgamated. Then add wood or sawdust in such quantity that it will stir up into a sufficiently consistent mass to be molded into cakes, and when dry it will form a very good fire-kindling material. It is the invention of Elizabeth Bellinger, of Mohawk, N. Y., and was patented to her this week.

Steel Plow.

By this invention the mold-board and lay always retain their form while on the frame or foundation; and in case the lay becomes sprung while being sharpened, it will be caused to take its original shape when applied to the frame or foundation. Thus all inconvenience from the lay and mold-board in steel plows being sprung and banging in the soil, is avoided. A perfectly smooth and regular steel surface is presented to the soil. This plow is well adapted for western lands. It is the invention of John Lane, of Lockport, Ill.

Bail for Millstones.

Joseph M. Glover, of Skegg's Creek, Ky., has patented an improvement in the above, which consists in having a box placed at the bow or bend of the bail, and a block secured in it; the block resting on the point of the spindle, and rendered capable of being adjusted by means of set screws, so that the stone may be balanced with great facility; also, when the hole in the block becomes worn, the block may be readily removed and a new one fixed in its place.

Rock Drill.

An improvement in the method of mounting drills so that they may readily be adjusted to the direction that it is desired the hole may be bored in the rock, has been patented by Joseph E. Nesen, of New York. There is also an arrangement contrived for griping the drill, at the proper time, and again loosening it, so that it may strike the rock with some amount of force.

Printing Press.

This invention is an improvement on hand presses, and is designed to facilitate the operation of printing by hand, so that the work may be performed in a much more expeditious manner than at present, and equally as perfect, with much less labor. It is patented by J. Henry, of Vevay, Indiana.

Workbox and Escritoir.

Charles C. Schmitt, of New York, has patented a most ingenious workbox for containing articles of value, such as jewelry, &c., The secret drawers are most cleverly arranged, and the whole is a unique and beautiful piece of workmanship.

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New Inventions.

Artificial Legs.

A patent has recently been secured in Great Britain for an improvement in this humane invention. It consists in the employment of elastic cords connecting the thigh with the foot, to imitate the action of the natural muscles, for the purpose of controlling the movements of the several parts of the limb. In cases of amputation above the knee, a sack is applied to the socket of the thigh, which sack is of proper form to fit the stump of the natural limb, and suspended at its mouth from the edge of the socket of the artificial one, for the purpose of assisting to support the patient, and relieving the stump from the unpleasant, and often painful and injurious, pressure that is produced upon it by the ordinary method of supporting it, by forcing it into a tapered socket. O. D. Wilcox, M.D., of Easton, Pa., is the inventor.

This improvement was secured by patent through the Scientific American Agency.

Watchmaking.

The Hon. N. P. Banks, in his address at the Crystal Palace, a few weeks ago, alluded to the manufacture of watches in this country, and stated that a watch could be made in three hours equal to any imported from London or Paris. This is an astonishing fact, but not quite so surprising as that we have excelled every country in making clocks, both as regards cheapness and regularity, and are as yet almost unable to make good and cheap watches.

We have now made a start, and a good one, and we have no doubt that we shall soon stand at the top of horological countries. In the year 1825 we imported watches to the amount of $320,498, and in 1855, to the amount of $3,651,187, which shows a tremendous annual increase of money sent away, that might have been used at home. There is no doubt that as regards cheapness we can beat the world; for our American clock can be bought in England for one dollar, while the cheapest Swiss or Dutch clock costs one dollar and a half. Yet in Holland and Switzerland labor is about half the price it is here. Now it is evident that if we apply the same principles of manufacture to watches that we have done to clocks, we must succeed equally as well. Yankees have demonstrated their capabilities in this branch of art in days long gone by. During the war of 1812, many were made in Worcester county, Mass., and some of them are still extant, and Messrs. Appleton, Tracy & Co. of Waltham, Mass., have just established a watch factory where the separate parts are all accurately stamped out by machinery and fitted by hands. The jewels are bored by hand, and the corresponding pivots fitted to them by females. All the watches are made alike, so that they can be easily repaired, and any part of one size will exactly fit any other watch of the same size, so that they can easily be repaired and refitted. The simplest kind of lever watch without the fusee is the form adopted, and they can turn out about ten thousand per annum. We hope they may have occasion to test their productive powers, and thus gain for themselves the honor of being the pioneers of American machine-made watches.

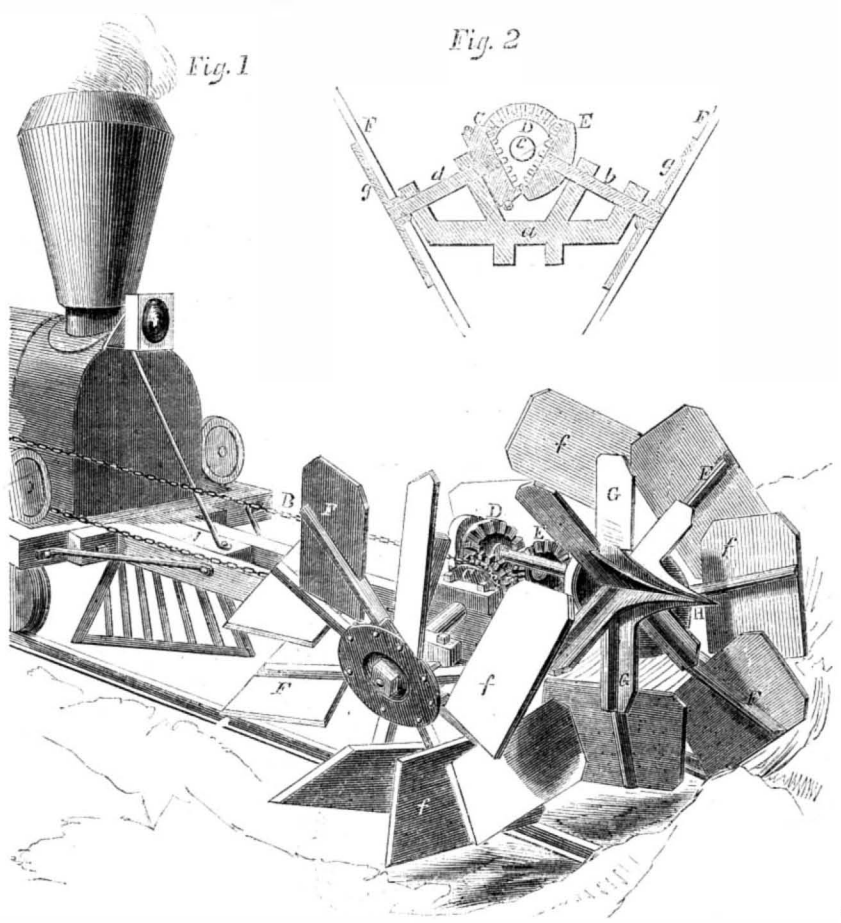
We are indebted to the Waltham *Sentinel* for the majority of facts stated in this article.

Improved Snow Plow.

One of the most serious inconveniences of railway traveling incidental to our northern climate in the winter season, is the frequent interruption of business occasioned by heavy falls of snow. Sometimes, for the space of a whole week, the traffic on certain roads has been suspended from this cause. It is therefore not surprising that ingenuity should be directed in devising some apparatus for a speedy clearing of the track, so as to enable the traffic to go on uninterruptedly.

Our engraving represents a machine for the purpose of removing snow from railroad tracks and roads, and it is also applicable to other purposes, such as removing earth ditching, &c. A snow plow constructed on this plan has been tried on various railways, and found to operate successfully. It may be used with horses on turnpike and other roads, and will answer for ditching in sandy soils.

URMY'S SNOW PLOW.

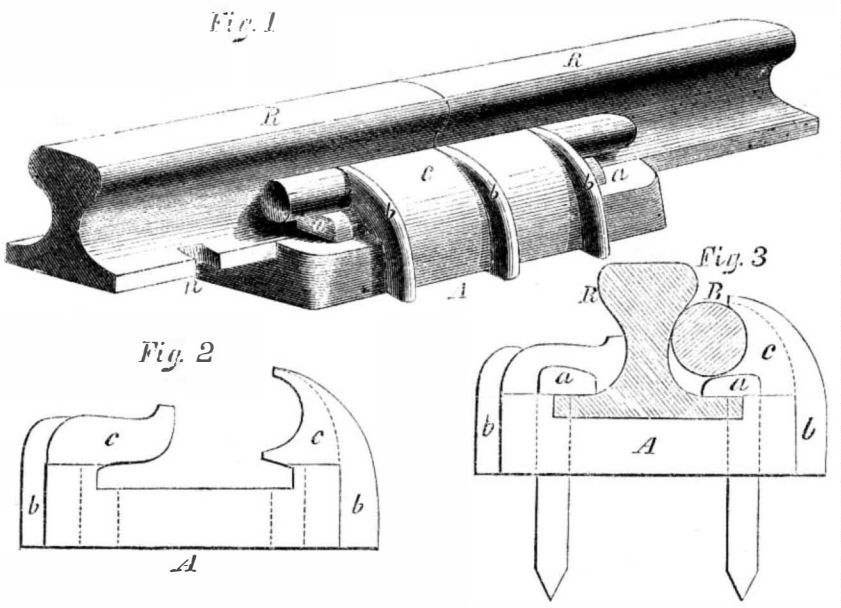


E have fans, *f*, on their ends placed obliquely to them, so as to throw away the snow up the bank during the motion of the machine. The flyers, G, on D, are at right angles with the arms, and have a point in the center, H, which bores the way through the snow while the flyers, G, throw it into *f*. The arrangement of C and D will be better understood by reference to Fig. 2, which is a section through them. *a* is the frame supporting the wheels, C, D and E, which have shafts, *b c* and *d*, attached to them; on these shafts are fitted the frames, *g*, and they hold the arms, F, carrying the fans, *f*.

This machine is the invention of Jesse Urmy, of Wilmington, Del., from whom further particulars may be obtained. It was patented Nov. 10, 1857.

Fig 1 is a perspective view of the machine, placed in front of the locomotive, supported by the bars, A. B is a chain, by which motion is given to the flyers from the engine by passing over the obliquely placed wheel, C, which in its turn rotates the wheels, D and E. On the axles of these three wheels are placed the radial arms, F; those attached to C and

IMPROVED RAILROAD CHAIR.



This improvement is on that kind of chair called a key chair, in which a wooden pin is driven in by the side of the rails to tighten them in their places, and deaden the sound. It has been tried on the New York Central Railroad, and has given every satisfaction. The improvement consists in placing the spike holes nearly or directly under the key when it is in its place, so that when the spikes and keys are in their places the heads of the spikes will be in contact with the key, which prevents them from jarring out, and they, in their turn, prevent the key from shaking out also.

Fig. 1 is a perspective view of the chair and rails, Fig. 2 is an end view of the chair by itself, and Fig. 3 an end view of the chair and rail. Similar letters refer to the same parts in each.

A is the chair, placed at the junction of the two rails, R R. B is the key, and *a a* the spikes. The sides or lips of the chair, *c c*, are made of proper shape to grasp the rail by its flanges at the bottom, and one or both of them is made with a recess on the inside to receive B. The lips, *c c*, are made of requisite thickness to give strength, and have ribs or beads, *b b b*, on them, to increase their stiffness and strength. The ends of the rails, as is usual, have notches cut in their lower flanges at a proper distance from the end, for the spikes to catch into. One of them is represented at *n*, Fig. 1. These holes are so placed that the spikes pass through them, and the heads of the spikes are hooked as represented, and stand under the key, and in contact with it; the key, therefore, prevents the spikes working up and down.

This complete railroad chair is the invention of John S. Robinson, Levi Herendeen and George Sheldon, of Canandaigua, N. Y., and was patented by them October 27th, 1857.

Further information may be obtained by addressing Robinson & Herendeen, as above.

A Few Words about Ourselves.

"When some one comes, with accents smooth and oily,
And tells you that a friend you valued highly
Has fallen into grevious paths of error,
Or done a deed which makes you quail with terror—
Unless you know there's truth in what he's saying,
'Twere best to think that some one has been playing
On his credulity; it may relieve him
To tell the tale to you—*but don't believe him.*"

We have no desire to encumber our columns with matters strictly personal to ourselves, but we feel justified in presenting the accompanying extracts from correspondence addressed to us, especially as it is well known that inefficient Patent Agents are never slow to start rumors prejudicial to our reputation. This fact is fully developed by Mr. Turner, of Aztalan, Wis., whose letter is appended, and has all the ear-marks of a system which has been steadily pursued for some years—not, however, to our injury, among those *who know us best*; and if we considered it necessary to do so, we could publish a list of such references—beginning from the highest official authority in the United States down—such as would shame those who seek, in a covert manner, to injure us.

MESSRS. MUNN & CO.—I am in receipt of my Letters Patent from the Patent Office, executed to my entire satisfaction. I was not expecting them so soon, especially on account of the disarrangement in the Patent Office occasioned by the resignation of Mr. Mason, the former Commissioner, and the appointment of his successor. I can account for the speedy termination of the business at Washington only from the prompt and energetic manner in which, I am convinced, you are wont to act for your clients as Patent Attorneys—*the malice of some notwithstanding*—as I was repeatedly cautioned, before I went to New York, to keep clear of your firm; but after my arrival in your city, I thought it would do no harm to have a look at some of you, as, by so doing, I might be able to judge for myself in regard to your intentions towards your clients, whether honest or dishonest. The result is, I was satisfied with the integrity of your intentions; and by leaving my business wholly in your hands, I am satisfied I have attained what I sought (through your influence) sooner than by *any other channel that had been suggested to me*; and should I again have business of like nature to transact, I would be sure to call at No. 128 Fulton st., New York City.

Respectfully yours, D. E. TURNER.
Aztalan, Wis., October, 1857.

MESSRS. MUNN & CO.—From your kind notice of my nail machine, it has impressed me with a desire to express to you my sincere thanks for so doing, and for the despatch and business-like manner in which you secured the patent for it, and another one of a similar kind. Hoping in some future day I may have another opportunity of intrusting to you the charge of making other applications for patents, I remain

Very respectfully yours, JOHN WOOTTON.
Boonton, N. J., November, 1857.

* * * * * We have received the gratifying intelligence that our patent has been obtained. Accept our thanks for conducting the case with so much *ability and promptness—characteristics which, we are pleased to testify, you have always shown in all our business transactions with you.*

Very truly yours, RACE & MATHEWS.
Seneca Falls, N. Y., November 30, 1857.

The annexed letter is from the late Commissioner of Patents:—

MESSRS. MUNN & CO.—I take pleasure in stating that while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE came through your hands. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill, and fidelity to the interests of your employers.

Yours, very truly, CHAS. MASON.

We could fill our columns with extracts similar in spirit to the above, but we do not deem it necessary. The fact that the Scientific American Patent Agency is continually gaining the public confidence is, of itself, sufficient to stir up professional enmity among a class of irresponsible men, who have everything to gain and nothing to lose.

Sixteen patents have been issued to our clients, whose claims are published in this weeks' list, making *fifty-nine* within the past four weeks!

Valuable Discovery.

About three miles from Clear Lake, Napa county, California, and near the borax lakes, is a sulphur bank, from twenty to thirty acres in extent, and supposed to be thirty feet thick sufficiently pure for the use of the mint at San Francisco. The sulphur seems to be constantly forming from a dam, steam rising over the whole surface continually.

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Scientific American.

NEW YORK, DECEMBER 12, 1857.

Gun Cotton and Collodion.

When gun-cotton was first discovered, no other idea was entertained respecting its application than that of superseding gunpowder as an explosive agent. Since that period, however, it has, like galvanism, been applied to quite a number of useful purposes, as the principal ingredient of collodion. Common cotton is one of the forms of *lignine*, which is a compound of carbon, hydrogen and oxygen (the same as wood), but when subjected to the action of nitric acid, nitrogen enters into its composition, and this element is found in a great number of explosive substances.

In 1833, M. Braconet, of Paris, made the discovery that starch, sawdust and cotton wool, when treated with concentrated nitric acid, became very inflammable, taking fire at a temperature of 356° Fah., but were not really explosive. This invention remained merely as a chemical curiosity until 1846, when Professor Schonbein, of Vienna, made the discovery of rendering cotton explosive by the use of sulphuric acid combined with the nitric, in treating it. The following is a summary of his process for making gun-cotton, described in the specification of his foreign patent, secured in 1847:—

"Take nitric acid of the specific gravity of 1·45, and sulphuric acid of 1·85 specific gravity, and mix them in the proportion of three parts of sulphuric and one of nitric acid, and allow the mixture to cool to 60° Fah. The rough cotton, which should be thoroughly cleansed from extraneous matter, is immersed (in as open a state as possible) in a glazed earthenware vessel, and, when thoroughly soaked in the acid, is lifted, and the excess of acid squeezed out gently by a glass rod. The cotton is now covered over in a glass vessel, and left thus for an hour. It is then washed well in cold water, to remove the free acid, and is squeezed between rollers in a press, or, if a small quantity, between the hands; after which it is washed in a weak solution of carbonate of potash, (one ounce dissolved in a gallon of water,) to insure its freedom from acid, then dipped into a weak solution of saltpeter, (nitrate of potash,) is then pressed dried, in a warm room, and is fit for use."

Three parts (by weight) of gun-cotton thus prepared is equal in strength to eight parts of the best gunpowder. Great hopes were once entertained that it would be generally employed for all kinds of fire-arms, because it is so cleanly, and leaves no dirty residue behind it; but it ignites so rapidly, and is so liable to burst fire-arms, that it is dangerous to use, hence gunpowder still maintains its position for army and hunting purposes, except in Austria, where, as we learn by recent accounts, it is used for artillery. For mining purposes, however, it is certainly superior to gunpowder, and is now extensively used in Europe for blasting rocks. Another application of it has become very extended, namely, in preparing collodion—a discovery made by Dr. Maynard, of Boston, Mass., about seven years ago, and first applied as an adhesive plaster for wounds in surgery. This composition is made by dissolving gun-cotton made with the nitrate of potash (a substitute for nitric acid), and sulphuric acid dissolved in ether and alcohol, and is made as follows:—

Take finely powdered nitrate of potash, 40 parts, by weight, concentrated sulphuric acid 60 parts, and carded cotton 2 parts. The nitrate and the acid are mixed together in a porcelain vessel, the cotton added, and stirred in it with a glass rod for about four minutes, then the free acid is pressed out, the cotton washed in cold water, and dried in a loose mass, at a moderate heat. Take rectified sulphuric ether 125 parts, by weight, rectified alcohol, 8 parts, and cotton, 8 parts. The latter is added first to the ether, in a well stopped bottle, and the mixture shaken for some minutes, when the alcohol is added by degrees.

The gun-cotton prepared as stated is very soluble in the ethereal mixture, forming the well known collodion. When applied to wounds, or the surface of any object, the ether rapidly evaporates, leaving the gun-cotton adhering with wonderful tenacity, and forming a nearly transparent skin, air-tight, and almost impervious to water. It is employed in forming the fine cuticle on paper, and on glass plates for photographic purposes, and has been the means of greatly improving the art of sun painting; it is also used for gilding, in architectural decoration, and a patent was recently issued to an inventor in this city for this beautiful application of it. By coloring with pigments, it has been employed for some time in the manufacture of French artificial flowers. It will readily be perceived how it is now extensively used as a valuable substance in surgery, photography, architectural decoration and for personal ornamentation, and may yet be applied to a hundred other different purposes.

The Steamship Central America.

Since we directed attention to the necessity of inventing improved means for saving life, and preventing such calamities as befell the above unfortunate steamer, we have received several communications on the subject; but we must say, that while it is not so difficult to suggest new and good plans of safety, it is very difficult to have them carried out by the owners of vessels, if they entail extra expense. This is a miserable piece of policy on their part, as every means which they take to ensure the safety of their vessels and the lives of their passengers, even at considerable extra outlay, ultimately leads to enlarged profits, by an increase of traffic.

A correspondent writing to us from Stockton, Cal., on this subject, suggests that all steamers carrying passengers should have the berths made with galvanized iron bottoms; and cylinders or tubes capable of being opened, and closed by tight covers, for the reception of passengers effects, and provisions and water in bottles, should be placed in some of them for cases of emergency. These berths may be fastened with clasp rings and bolts, to enable them to be rapidly put up and taken apart. In case of an accident to the vessel, the captain can order each passenger on deck with his berth, a number of which berths can be fastened together by their rings and clasps to form several life-boat rafts of a very superior character. But if the sea is too high to admit of them being formed into rafts, each passenger has his own berth as a personal life-boat to ensure him a means of safety, if the ship should go down.

If such berths had been on the *Central America*, in all likelihood nearly every person on board would have been saved. That they can be applied to all passenger vessels, we do not entertain a doubt, but will they? that is the question. Life-boat berths are not altogether a new idea, as cork and india rubber life-preserving mattresses, which are so well known, embrace the same features; but they have never been generally adopted on board of vessels, so far as we know.

Another correspondent writing to us from Baltimore, Md., on the same subject, states that a very old seaman in that city suggests that every vessel which goes to sea should be provided with a false deck, which should be made so as to float from the true one, if the vessel should sink, and thus form a life-raft for passengers and crew. This false deck may be made in sections to lie upon the true deck, and should be supplied with hold-fasts, to prevent persons being washed overboard. Provisions and water casks should be kept lashed on it, for the hour of necessity. This is also a good suggestion; but while it is right to make every provision for such dangers when they occur, attention should be chiefly devoted to the prevention of such catastrophes by insuring, if possible, the perfect safety of the vessels themselves.

The committee of enquiry in this city, appointed to examine into the cause of the loss of the steamer *Central America*, have just made a report in which they positively assert that it was lost from sheer carelessness on the part of those who had charge of the engines. They say, "On the morning of the 11th Sept., at 7 o'clock, the ship labored to such an extent as to alarm the passengers and arouse the captain and chief engineer, who were in their berths or state rooms; and about noon, the gale still increasing, she fell off from the wind, and it then appeared that the fires in the engine-room had, by some unexplained carelessness, been allowed to go down, and had become so low that the engines gradually relaxed their speed and finally stopped working, and the steamer fell off into the trough of the sea."

The plain inference to be drawn from this is, that the *Central America* would have weathered the storm had the steam been kept up, and that from carelessness on the part of the engineers, this steamer, with quite a number of passengers, was lost. There seems to be defective organization in the management of our steamships. Most of the passengers on the ill-fated *Arctic*, we believe, would have been saved, had proper discipline ruled on board. The *Central America* had a defective crew, was without a carpenter or carpenters' tools, and the engineering department and that of the general government of the vessel under the captain appear to have been nearly independent of one another. This should not be; the whole management of steamers, like that of sailing vessels, should be under one supreme head. This is a regulation which should be carried out, and for this purpose, it is necessary that the captains of steamers should have a tolerably good acquaintance with the marine engine, to do their duty efficiently.

Light and Color.

So intimately are all our ideas of things material connected with light, that it is impossible for a human mind to conceive or form any distinct appreciation of this world, or the heavens of which it forms a part, and by which it is surrounded, before the issuing of the Almighty mandate, "Let there be light." The beauty of the fitness of all things is in no way more truly appreciated, than when we consider the diffusion and adaptability of this omnipresent, elemental force. Each beam of the pure, colorless light of day is composed of three distinct rays, the red, the blue, the yellow, and these and their compounds or complimentary colors, form the beams that travel from the sun to us in eight minutes. All nature derives its color from these colored rays, and really there is no such thing as actual color, it is only decomposed light. Thus the tender, modest violet pushing its tiny loveliness from among the coarser plants on some hedge side, is so constructed that it absorbs all the rays except the violet one, and that it reflects, and this reflection is the color of the plant; the hardy old red sandstone cliff absorbs all rays but the one shown in its color, and the same is the case with all created things. This fact of all objects being really colorless, is easily proved by a simple experiment that may be tried by our juvenile readers any winter's evening. (Here we would say that it is our intention to give occasionally, as we have space, special articles with simple experiments, each teaching some philosophical truth for the juveniles' instruction and amusement, these long and dreary winter evenings.) Now then for the experiment: collect as many articles of different colors as you can in a small room, the more glaring the hues, the more astonishing the result; when this is done, pour some alcohol on a plate and throw into it a handful of common salt, light it, and it will burn with a yellow flame, and all the gaudy colors will be gone, nothing but one dead yellow being visible, even the color is taken from the cheeks and dresses of the spectators, all of them appearing a ghastly hue; thus proving that color depends on light and not light on color.

Three Weeks More and the Result Will be Settled.

We would call the attention of our readers to the fact that there are only three weeks more before the successful competitors for our prize list of *Fifteen Hundred Dollars* will be rewarded for their exertions.

Every one who has entered the field of competition cannot expect to reap the reward in cash, but fifteen of those who have best succeeded in obtaining subscribers for our publication will receive, in the aggregate, fifteen hundred dollars, in sums varying in amount to each, according to the number of mail subscribers they have sent in to us, and paid for, since this volume of the Scientific American was commenced.

Those few who entered the course for competition when the announcement of the prizes was first made, but who have not, from their own inertness, or from the pressure of the times, continued in the contest, will, we hope, feel that they are well repaid for the exertion they at first put forth, in the consciousness that they have done their neighbors and townsmen a favor by introducing the Scientific American to their notice, and inducing them to subscribe, and thus insure the weekly visit of a paper in which no information of a pernicious or demoralizing character appears; we regret to say this can be asserted of but very few literary papers of the present day. The benefits and pleasures which these subscribers and their families derive from the weekly visit of the Scientific American, we leave for each patron to estimate for himself.

A few days ago, we were led by curiosity to foot up the amounts remitted to us by a single competitor, and, from the names sent, to calculate whereabout in the list of prizes he would stand: we found to our astonishment that, if the awards had been made on that day, the competitor in question would not only have received back the full amount which he had remitted for all his subscribers, but would have received the additional sum of $160. We ceased our calculations when we arrived at this result, fearing lest we might arrive at still less satisfactory conclusions to ourselves by looking into the prospects of other competitors.

This example shows what an opportunity still remains for some of the smaller competitors to augment their lists of names during the next three weeks, and then to receive a respectable sum for their exertions, over and above the total investment.

Polishing Glass, Metal, &c.

In polishing plate glass and other substances on a polishing bed having an unbroken flat surface, and using therewith a fine polishing material in a moist state, all air is excluded from between the polishing bed and the slab, or substance under operation, consequently the pressure of the atmosphere on the back of the slab is the cause of great friction, which necessitates the exercise of very great power to produce the motion necessary for polishing. In order to overcome this difficulty, Phineas Burgess, of this city, has invented and patented (in Great Britain) an improvement which consists in grooving the surface of the polishing bed in circles, eccentric to its axis of rotation. By grooving or otherwise similarly reducing the surface of the polishing bed, for the purpose of admitting air under the slab, the retarding atmospheric pressure will be materially reduced.

The above improvement was secured by patent through the Scientific American Patent Agency.

Iron Planes for California.

We have received a communication from a correspondent in Auburn, Cal., in which he states that common bench and molding planes made of wooden stocks are unsuited to the dry climate of that country, as they warp and become unfit for use. He believes that planes made with iron stocks would be more suitable to the climate, and that a general assortment of such, well made, if sent out there, would find a ready market.

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What Causes Vibrations in Dams ?

This is a subject which has endangered many an animated discussion among men of science, millwrights, and others, and it seems to be still a mooted question. It has been noticed that natural waterfalls, however great, seldom produce any vibrations in their immediate neighborhoods, while some artificial dams jarr the buildings in their vicinity for several miles around. The cause of this phenomena is worthy of investigation, for it is desirable to build dams that will produce no vibrations. To an inquiry made of us a few weeks since, by a correspondent in Vermont, we gave an answer which has called forth some important information on the subject.

In a letter received from R. Fitzgerald, of New Haven, Conn., he takes the ground that the jarring effect produced by some dams is caused by compressed air, under the smooth sheet of water, and not by the falling of the water. He states that, "forty years ago, there was a dam across the Salmon river, at Malone, Franklin county, N. Y., which had a smooth sheet of water passing over it, and the windows of the houses in the village were kept constantly vibrating by it, until a tree drifted down the river and lodged in the central part of the dam in such a position as to break the sheet of water, when the jarring of the windows ceased." This he attributed to the tree allowing the confined air to escape. Since that period, he has witnessed many similar cases.

Our correspondent has formed his opinion without positive proof as to the cause; he may be right, but our opinion differs from his. In our last number, we intended to publish his letter (but were unable to do so), with the following answer:—"It appears to us that air should act as an elastic cushion to prevent, and not cause, vibrations in waterfalls. Any obstruction which breaks a sheet of falling water prevents the regularity of its vibrations, and stops or modifies jarring sensations, upon the same principle that a body of soldiers walking at random over a suspension bridge prevents it vibrating, whereas, if they keep in regular marching order, they will cause it to oscillate violently, as was done near Manchester, England, in 1831, by which a bridge fell down."

Since we penned the foregoing, we have received a copy of the transactions of the American Academy of Sciences, just published, giving an account of the meeting held at Boston in September last, at which there was a paper read on this very subject, by Charles Stodder, in relation to the dam at Hadley Falls, on the Connecticut River. It seems that the vibrations of this dam are extensive in their influence, and, in fact, are a subject of wonder, being felt at Springfield, seven miles distant, and at Amherst, distant fourteen miles. In his paper, Mr. Stodder states that the only cause he "has seen assigned for this phenomenon is the agitation of the air behind the falling sheet of water"—the same cause as that described by our correspondent, Mr. Fitzgerald. Mr. Stodder, however, entertains a different opinion, and states that such a theory is entirely disproved by a dam at Lewiston, where the water falls over an inclined plane, leaving no space for air under it, and yet the vibrations are very decided.

The dam at Hadley is 1,000 feet long, and it has a vertical fall of 32 feet. The water does not fall in an even stream from the summit of the dam to the surface of the water below, but the upper surface in section presents to the eye a waved outline. This appearance Mr. Stodder has noticed at Hadley, Nashua, Lawrence, and other vertical falls. What is the cause of this? The following is the answer of Mr. Stodder:—"The phenomena is caused by that property of falling fluids by which they assume the globular form, which may be seen at the Kauterskill Falls on the Catskill Mountains, where the whole body of the falling water is broken into drops. Applying this principle to the fall over an artificial dam, the water at the very commencement of its descent begins to assume that form, and the further it descends the nearer it approaches to it. In passing over a dam like that at Hadley, the water presents a uniform depth throughout the whole length of the dam, and if we imagine the current of water to be an infinitude of small streams of uniform depth in contact with one another, each having the same tendency, the result must be to produce swellings and contractions throughout the whole extent of the dam. When each of these waves strikes the bottom, it gives a blow proportioned in force to the body of water falling from the hight of the dam. Every variation in the depth of the water causes a variation in the size and distance of the waves, each of these causes a concussion in proportionate intensity to the weight of water in it, and in rapidity to their distance apart. These effects of falling water should be expected in general only on artificial falls, such as mill dams." Respecting natural falls, he says:—"As their faces are rarely vertical, but are broken with angular rocks, causing various depths of water on them, and as every variety of depth alters the conditions to form the concussive pulsations, there is no coincidence among them, so that the waves of one part strike the bottom in the invervals of those of another part, and thus the concussion of one neutralizes the other. At Hadley, the dam is one right line from bank to bank, the bed of the river is solid rock, and the top of the dam is level. The waves or pulsations of falling water are uniform, and strike the bottom with sychronous concussion from one end of the dam to the other. It is not surprising that the earth should be felt to vibrate at Springfield and Amherst."

We have presented a similar idea to this in the case of a body of soldiers marching over a suspension bridge. At the close of the reading of Mr. Stodder's paper, Dr. C. T. Jackson, to controvert the opinions advanced in it, stated that vibrations were noticed at the dam in Nashua, N. H., "only when the wind is in such a direction as to break the fall and permit the air to escape, which is evidently confined behind the sheet of water."

The two opinions here set forth are all that we have ever heard advanced as to the cause of vibrations in dams. We must say that we cannot see how air can cause such vibrations, and the circumstance stated by Dr. Jackson, as an argument against Mr. Stodder's opinion, is one we would construe in favor of it. As the vibrations of the dam at Nashua are only felt when the wind is in a certain direction, in all likelihood it produces the synchronous pulsations of the falling water just in the same manner that it causes suspension bridges to oscillate, and by which peculiar undulations it has caused a number of them to fall. The tree which stuck in the center of the dam over Salmon river may have disturbed the regular undulations of the water, and thus have stopped the vibrations. But, be that as it may, it appears to be a fact which engineers will do well to investigate, as it may afford important information in relation to dams, whereby they may be constructed so as not to produce vibrations.

[For the Scientific American.]

Fluid Pressure.

A fluid is usually defined to be: "A body whose particles move easily among themselves and to yield the least force impressed."—(*Webster*); but from the true nature of a definition, which should include the sense of the thing defined and exclude everything else, the above does not, strictly speaking, define a fluid.

The "particles" of fine sand, superfine flour, or of any body in a finely pulverized condition, "move easily among themselves and yield to the least force impressed" upon them and to some extent, "when that force is removed, recover the previous condition;" but the substances mentioned are not fluids, and we must look a little deeper into the constitution of fluids, and from an understanding of them thus obtained, frame their definition.

Without regard to the constituents of the atoms or particles of which a fluid is composed when viewed chemically, it is sufficient here to consider each and every one of itself incompressible and surrounded by an atmosphere, so to speak, of heat—that each particle attracts every other, and is itself attracted by a force which we call *cohesion*, and that the atmospheres of heat strive continually to separate the particles from one another.

The modified action of these forces—the attraction of *cohesion* and the repulsion of *heat*—determine the three forms in which all matter is known to exist—*solid*, *fluid* and *gaseous*. When a certain portion of heat is driven from a mass of matter, cohesion draws the particles together, and a solid body is formed; on the other hand, when we add heat to a solid body, it becomes fluid, and a further addition of heat expands it into the gaseous form. It will appear that the less heat a body contains the more permanent is its character. Solid bodies retain their form for years; fluids, though easily placed in vessels, readily evaporate; gaseous are difficult to retain—very evanescent, and when not closely confined, almost immediately expand into space.

But regarding fluids, of which water may be called the type, they may be said to be bodies in which the attractive force of cohesion exactly balances the repulsive force of heat, and thus the particles of which they are composed, still retaining their atmospheres of heat, (all bodies having some heat, and it can never all be expelled,) move among each other, and are separated and brought together with the greatest facility. Here, then, is the definition of a fluid:—*A body in which the force that would draw its particles together exactly balances the opposing force that would drive them asunder.*

It is plain that in solid bodies cohesion preponderates over the repulsive force of heat, as in gaseous bodies the atoms are entirely beyond the sphere of its influence. When investigating the mechanics of a fluid, it is as necessary to omit certain considerations which would be likely to complicate and confuse the process; as when we study the properties of a lever, we pay no attention to the weight of the same, nor of the material of which it may be made.

It is true that fluids are affected by gravitation, and have weight in common with matter of all kinds; but we can imagine a fluid—water for instance—ceasing to possess weight without ceasing to lose its peculiar properties as a fluid. Such a body would act very strangely—it would neither fall nor flow from a vessel; being perfectly passive in its nature, it could be moulded into any form, separated into parts and put together again; but the most remarkable property it would display next to its incompressibility, would be that of equally transmitting pressure in all directions. Suppose it was contained in a vertical cylinder of say one hundred inches area, and on it was resting a closely fitting piston. If the piston have no weigbt, it is clear the fluid experiences no pressure, and if the bottom or the sides of the cylinder or if the piston were pierced with an orifice, no portion of the fluid would escape; but, if we load the piston with say 100 pounds, it will tend towards the bottom of the cylinder, and, of course, will press upon the fluid, the particles of which having perfect mobility, the mass would at once conform itself to the shape and size of the cylinder, and would sustain the piston; not, however, unless it, in turn, is sustained by the bottom of the cylinder. Being incompressible it may be regarded as a solid body, and then the transmission of the 100 pounds to the bottom of the cylinder is easily understood. Now, as the whole pressure of the piston is borne by the whole area of the cylinder's base, it is evident that one-half of the base sustains fifty pounds, and that any square inch of surface on the base sustains one pound. So far, this imaginary fluid does not differ from a solid in the transmission of pressure, but the peculiar characteristic of a fluid is that the same effects are produced upon the sides of the cylinder, and against the under side of the piston. The fluid being under pressure as before, and its particles free to move in any direction which is consistent with the nature of all fluids, if an opening be made in the side of the cylinder, it will spout out, and if the piston be perforated, the fluid will spout upwards. If these openings are one inch square each, it will require one pound pressure to prevent the fluid from escaping; if fifty inches, fifty pounds, and so on proportionally.

Admitting these facts to be true, it must be evident that *fluids transmit equally and in all directions the pressures exerted upon them.* Again, let us suppose we establish a direct communication at the bottom of this cylinder with a small cylinder of one inch area, also fitted with a piston, from what has been shown, it is plain the small piston must receive an outside pressure of one pound to keep it in place against the outward thrust of the fluid. If we force the small piston in its cylinder against the fluid, say a distance of one inch, the large piston must be raised, but it need not move only one hundredth part of that distance to make room for one cubic inch of fluid, because that cubic inch must spread over 100 square inches of surface; we have really raised 100 pounds by the movement of one pound, but we have only raised it a hundredth part of the distance—what we have gained in power we have lost in distance. Thus we have a simple machine, which, like all others, depends upon the principle of *virtual velocities*, and is to all intents and purposes the hydrostatic press, known in mechanic arts and appliances to possess extraordinary advantages over the wedge, lever or screw, especially where immense pressures are required.

If we now confer weight—the attraction of gravitation—upon the fluid in question, it must be evident that it can in no wise alter the property of equality of pressure, except so far as the additional pressure arising from the gravitating tendency of the fluid is concerned. The fluid by no means exists as such by virtue of gravitation, but is only modified in its mere mechanical performances by it, and under the influence of this force finds the lowest position possible for its parts, and seeks a level for its surface.

Considerations of this character seem to clear up the apparent anomaly which is inseparable from the ordinary method of statement regarding the equality of pressure. We say the pressure is equal in every part of a vessel containing fluid, and in all directions, and every one knows that in a vessel containing water, the heaviest pressure is on the bottom; that the pressure on the sides is greatest at the bottom, and least at the top, and if the vessel be full and have a lid, the lid would experience no pressure at all. We must understand that equality of pressure is due to fluidity only, and that the inequality of pressure which every vessel containing fluid experiences is due to gravity; the one is determined by estimating density and altitude, the other is the active principle of fluidity.

Y.

Ores.

This term is applied to any form in which metals occur naturally and from which they can be extracted by subsequent metallurgic processes. Metals are always found in one of the following states: either pure as native metals or combined with others forming natural alloys; combined with sulphur, forming sulphurets or sulphides; in combination with oxygen producing oxyds, or with acids forming metallic salts, as carbonates, sulphates, phosphates and numerous others. They are found in lodes or veins, which are cracks in rocks filled up with ore, or in beds, where the ore takes a place in the strata of the country as a regular geological deposit.

Sometimes the more precious metals are found in streams, to which they have been brought by the water breaking off pieces of the parent vein and carrying these down the current, gradually rounding off the sharp angles and breaking them up into powder, as found in the gold fields of California and Australia. In some situations gold has been found in a fibrous condition.

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Correspondents

H. R., of Iowa.—The oreide of gold is described on page 308, of our last volume. The hands of watches are colored red by a simple lac varnish tinged with carmine.

H. W., of Vt.—The increased quantity of hydrogen given off at the negative pole of a battery under water, by attaching a piece of zinc to it, is due, we think, to the decomposition of the zinc itself by the water; the oxygen of the water unites with the zinc, and the hydrogen escapes.

C. C., Jr., of Mass.—If you write on paper with a solution of the muriate of cobalt it, it will become invisible until it is exposed to heat before a fire.

H. E. O., of N. Y.—The subject "In what part of the earth is attraction greatest?" is more speculative than instructive. We do not question the correctness of your views.

R. A. R., of Maine.—We are happy to answer your question, and hope that all who are "too poor to buy knowledge in bound volumes" will apply to us, and they shall have it gratis. Shellac is procured from a tree in the East Indies, out of which it exudes as a resinous gum. It is collected and heated in linen bags, through which it drops on to flat plates, and these are broken up as we import them. Its chief use is in the manufacture of sealing wax.

D., of N. Y.—A paint of boiled linseed oil and litharge is used for protecting wire rope and the hulls of iron ships. It is the best coating, we understand, that has yet been applied for this purpose.

G. H., of Ohio.—If you wish your engraving sent to you by mail, please remit fifty cents in stamps, to prepay the postage.

W. L., of Md.—A patent cannot be secured for making chimney flues of enameled or glazed carthenware. Flues of this character have been used.

L. H., of Mass.—It is not new to secure hubs to axles by means of a plate screwed to the back end of the hub, with flanges on the axle running in a recess. There are models of the same thing now in the Patent Office.

E. W. C., of Mich.—It has been held that a contract may be legally made to convey a future invention, as well as a part of one, or for any improvement or a part of one; and a bill in equity will compel the performance of a contract made under these conditions.

C. D., of C. W.—We are of opinion that you can procure a machine for making drain tiles of Emery & Brother, Albany, N. Y.

C. L., of Conn.—You must start right in your calculations, else they will all end in confusion and disappointment. There is no power gained by a lever—it is only a means of transmitting power; a lever in itself has no more power than a cobble-stone. In regard to a water wheel, we should prefer a 40-foot wheel, with 12-foot buckets, to a 20-foot wheel with 24-foot buckets, so as to obtain a more free reception and discharge of the water, but not on account of any gain in leverage.

E. P., of R. I.—We cannot undertake to give opinions upon questions of infringement. You must consult some attorney in your own place.

A. R., of Cal.—We have entered your name with Mr. Locke, in our subscription books, for five years each, and mailed to both a bound volume (XII) to balance your account.

D. P. F., of Conn.—In No. 32, Vol. I, Scientific American, you will find an engraving of an apparatus for kyanizing timber.

F. P. N., of Cal.—You have got our old friend Porters plan for extending telegraph wires across rivers, and from mountain to mountain across valleys, by means of small balloons inflated with hydrogen gas. The plan is very good in theory, but in practice you would have two or more difficulties to encounter; first, you could not retain the gas in the bags; and secondly, the wind would play the mischief with the bags if they could be made to hold the gas.

G. W. C., of Ohio, says:—"There has been quite a controversy here, among some of the knowing ones, and to settle the matter, they have concluded to leave it to your decision. The circumstances are these:—Suppose A receives a patent for a certain machine, and sells the undivided one-half of his said patent to C; then the said A (the patentee) makes an improvement on his patent, and gets it patented. Now the question is, whether the said C has an equal interest in said improvement with the patentee?" Answer.—Unless the original assignment of one-half of the patent to C particularly specified that he should be entitled to an equal interest in any improvement which A might subsequently make in the machine, C would have no interest in it whatever.

Condit & Vaughan, of Exchangeville, Pa., wish to purchase the best machine known for turning carriage spokes.

D. R., of Wis.—To enable us to get up a nice engraving of you saw-mill, it will be necessary for you to furnish us with a model to take the views from. The expense would be $15. We cannot recommend to you any agency for the selling of your patent that we know of. Our observation has taught us that an inventor can sell his own invention better than a second party, unless the agent he may appoint makes it his sole business to operate with one patent only. Most agencies who make it a business to sell patents take so many inventions in hand to dispose of, that their attention is divided among a dozen or more different interests, and thus they seldom accomplish anything.

L. L., of Pa.—You can stain a blackboard with a strong solution of logwood and copperas, applied hot with a sponge. After it is dry, give it a coat of paint made of boiled linseed oil and lampblack, which you must allow to dry perfectly before it is used. In this manner you will make an excellent blackboard. If you wish to make one on which to write with a light-colored slate pencil, mix some fine emery or ground glass with your paint.

W. R., of Ohio, inquires:—"If, in case a patentee assigns a portion of territory to A, and another portion to B, and A takes out a re-issue, can B, on suing for infringement, have the benefit of said re-issue?" The object of the re-issue of a patent is to correct some mistake or error which has arisen from inadvertence. It is done by surrendering the old patent and obtaining a new or amended one. The assignee has a perfect right to his interest under the re-issued patent, and his right ceases only when the patent expires. The assignee would have no legal interest in the patent if extended beyond its original date.

B. F., of Ind.—We are not acquainted with any other process for preserving eggs than that of immersing them in lime water in tubs. The slacked lime should be stirred in the water until it is nearly as thick as cream, and the eggs then laid gently in it, and covered entirely with the water. We have seen eggs preserved fresh in this manner for six months; but while they are suitable for frying with ham, or for making pastry, they have a lime taste when simply boiled.

Z. E. C., of Conn.—There is no simple process for coloring furs black or brown. They are colored in the same manner, and with the very same substances, as wool and skins, but they require several dips, and the temperature of the liquors must be low. Logwood, sumac, and the sulphate of iron will color black; camwood, fustic and logwood will color brown.

W. G., of Mass.—Oil will dissolve gum shellac, which is not suitable to use for cement in an oil lamp. If you use some dissolved glue and litharge with the plaster of Paris, we think you will obtain a cement suitable for your purpose.

W. W. McC., of Ala.—Bourne's Catechism of the Steam Engine can be had for $1, of Appleton & Co., of this city. The *American Engineer* is defunct.

A. C. G., of Mass.—Your case will be brought up in a few days, for examination by one of our firm, who is in Washington, and a report upon the prospect of success sent to you. Your remittance of $4 pays for the advertisement in full.

R. S., of ——.—The divining rod is an exhausted subject. You state that a straight rod held between the fingers is just as good as a crooked branch held between the hands for pointing to water underneath the surface. We agree with you; the one, we think, is just as good as the other. But that either of them is reliable, or will twitch the hand when passing over a subterranean stream of water, we do not believe.

E. P., of Ohio.—There is no existing patent on the counting-house ruler, having a parallel roller which extends its whole length, and revolves on pins in metal plates at each end. This patent was granted in 1832 to James Carrington, of Conn., and is now public property. This ruler, as originally patented, had two rollers; they are now usually made with but one. You can make as many as you please.

C. C. H., of N. Y.—Any kind of oak wood used in steam boilers tends to prevent incrustations. You can stop your hands from sweating, to enable you to play on the violin, by washing them in a solution of alum, and allow them to dry without wiping off. But we advise you not to do this in order to be skillful on the instrument, because it is not safe to stop the pores of any part of the body from throwing off their natural perspiration.

W. F. D., of Va.—Your method of rapid multiplication appears to be similar to that practiced by Peter Deshong, a great calculator, who lived in this city about nine years ago. So much has been done in the way of making arithmetical rules for rapid multiplication, that it is difficult to say what is new and what is old.

G. C., of N. Y.—A strong solution of fine isinglass, in which a very little French chalk has been intimately mixed, will, if placed between two pieces of mother-of-pearl, and allowed to dry, form an artificial mother-of-pearl, possessed of a surface displaying all the varying hues of the natural substance. The artificial mother-of-pearl manufactured in Paris, is formed of a paste, the principal ingredient of which is a solution of fishes' scales, but we are not acquainted with the minutæ of the process.

J. M., of Pa.—We do not think that the governments of either the United States or Great Britain have ever offered a reward for the discovery of the cause and prevention of the potato rot; neither can we believe that you have made this discovery, though we certainly hope you have. The United States Agricultural Society is the proper medium for you to look for compensation—not to Congress.

E. R., of Mass.—By melting and cooling lead several times in succession it becomes somewhat harder. To form an alloy of lead and zinc they should be melted separately, then mixed together in a molten state, and carefully stirred for a few minutes. This operation must be conducted with great caution; the zinc should be poured very slowly among the molten lead, or it will be liable to spatter out.

R. M., of C. W.—Water lime is hydraulic cement. It is the best thing you can use to form a concrete foundation for a house in a damp situtation. It is employed for the lower stratum of foundations, and for the inside and outside plaster of brick walls under ground, in some localities, and answers an excellent purpose; but the interior rows of the bricks are united with common mortar. Gutta percha tubes answer very well for conveying water, if made strong, but they are liable to be eaten by rats; therefore we do not recommend their use in exposed situations. If you do not wish to use lead pipes, use cast iron or wood.

M. C., of R. I.—A paper for covering buildings has been made by taking finely-ground coal and sulphur, and intimately mixing them with pulp. By passing the sheet between heated rollers, the sulphur is melted, and thus the paper is rendered impervious to water. We cannot advise you to use it; better get prepared canvas.

A. F., of Oregon.—Addison Everett, of Middlefield, Mass., secured a patent some years since for a lathe for turning hollow woodenware. Since that time, we believe no patent has been taken on machines of this class.

U. U. G., of Pa.—We do not know where you can obtain recipes for making six gallons of distilled spirits from one bushel of malt; the larger portion of such a production must be the water.

J. H. P., of Me.—In the manufacture of potato-brandy, the crude spirit is found to be contaminated with an acid volatile oil, called "fusel oil," which is extremely difficult to separate in a complete manner. Towards the end of the distillation it passes over in considerable quantity, when it may be collected by washing the spirit away with water. It is this substance that gives the peculiar pear-like flavor to many spirits; and it is much used by confectioners to flavor candies. It is a most deadly poison, and should be used with caution. When possible, it is better to re-distill the liquor than to let it remain in, as its effects, however slow, are very sure.

Money received at the Scientific American Office on account of Patent Office business, for the week ending Saturday, December 5, 1857:—

H. F. B., of Ill., $30; R. L., of Wis., $13; H. F. S., of Mich., $25; J. K. B., of N. Y., $10; P. C. M., of Ill., $37; G. & S., of Vt., $25; V. R. D., of Ill., $25; J. L., of Tenn., $30; W. W. D., of Cal., $50; J. G., Jr., of R. I., $32; J. O., of Pa., $25; L. C. W., of N. C., $30; G. P. K., Jr., of Ind., $30; H. U., of N. Y., $45; E. E., of Ill., $25; L. K., of N. Y., $30: A. S., of N. Y., $30; E. C., of Mass., $100; A. B., of N. Y., $55.

Specifications and drawings belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, December 5, 1857:—

J. V. J., of Mich.; D. E. of Ohio; J. E. H., of N. Y.; D. W. of L. I.; D. G., of Pa.; W. M., of Ky.; S. C., of S. C.; B. & H., of Ill.; H. T. S., of R. I.; H. T. S., of Mich.; G. & S., of Vt.; J. G. Jr., of R. I.; A. S., of N. Y.; D. B., of R. I., (2 cases); H. U., of N. Y.; E. E., of Ill.; J. O., of Pa.

Literary Notices.

BLACKWOOD'S MAGAZINE—This favorite monthly, republished by Messrs. Leonard Scott & Co., 54 Gold st., this city, contains the conclusion of the interesting story, "Janet's Repentance," "Notes on the Isthmus of Panama," and several other excellent articles and stories. The number for this month is a good one.

SOUTHERN AID SOCIETY REPORT—We have received the Fourth Annual Report of this excellent Christian Society. It has received and appropriated about $52,000 since its operations began, and judging from the Treasurer's Report, the Society is getting a warm hold on the Christian community. The object of the Society is to diffuse gospel truth in the southern and southwestern States. The Treasurer of the Society is Gerard Hallock, Esq., Editor of the *Journal of Commerce*, in this city.

TO OUR SUBSCRIBERS.

RECEIPTS—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of the receipt of their funds. The Post Office law does not allow publishers to enclose receipts in the paper.

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Twenty-five cents per line each insertion. We respectfully request that our patrons will make their advertisements as short as possible. Engravings cannot be admitted into the advertising columns.

*** All advertisements must be paid for before inserting.

T. CLARK'S PATENT STEAM AND FIRE Regulator Manufactory, removed to Railroad Depot Building, room No. 33, Franklin street side. Said Regulators can be seen in operation at the exhibition rooms in said building, corner Elm and Franklin streets, New York.

VAIL'S SPEEDWELL IRON WORKS Morristown, N. J., manufacture Craig's Patent Double-acting Balance Valve Steam Engines, both stationary and portable, Knowles' Patent Muley, Portable, Gang and Re-sawing Mills, Sugar and Chinese Cane Mills and Sugar Pans, Grist Mills, Mill Irons, Rich's Water-wheels, Forgings and Castings. Orders for the above, and all descriptions of labor-saving machinery will receive prompt attention.
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MACHINE BELTING, STEAM PACKING, ENGINE HOSE.—The superiority of these articles, manufactured of vulcanized rubber, is established. Every belt will be warranted superior to leather, at one-third less price. The Steam Packing is made in every variety, and warranted to stand 300 degs. of heat. The hose never needs oiling, and is warranted to stand any required pressure; together with all varieties of rubber adapted to mechanical purposes. Directions, prices, &c., can be obtained by mail or otherwise, at our warehouse. NEW YORK BELTING AND PACKING COMPANY. JOHN H. CHEEVER, Treasurer, No. 6 Dey street, New York.

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A HANDSOME REWARD!

$1,500 IN CASH PRIZES.—THE PROprietors of the SCIENTIFIC AMERICAN, desirous of increasing their circulation, and doing away with the system of employing traveling agents to solicit subscriptions, offer the following splendid prizes for FIFTEEN of the largest lists of mail subscribers received at this office before the 1st of January, 1858:—

For the largest List	$300
For the 2d largest List	250
For the 3d largest List	200
For the 4th largest List	150
For the 5th largest List	100
For the 6th largest List	90
For the 7th largest List	80
For the 8th largest List	70
For the 9th largest List	60
For the 10th largest List	50
For the 11th largest List	40
For the 12th largest List	35
For the 13th largest List	30
For the 14th largest List	25
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Names of subscribers can be sent in at different times and from different Post Offices. The cash will be paid to the orders of the successful competitors immediately after the 1st of January, 1858. Circulars giving further particulars may be had gratis by sending to the publication office, 128 Fulton street.

We hope our friends in the country will avail themselves of the above liberal offer, and while they oblige us they will be benefited to a far greater extent themselves. MUNN & CO., Publishers.

☞ See Prospectus on the next page.

NEW HAVEN MANUFACTURING CO.—Machinists' Tools, Iron Planers, Engine and Hand Lathes, Drills, Bolt Cutters, Gear Cutters, Chucks, &c., on hand and finishing. These tools are of superior quality, and are for sale low for cash or approved paper. For cuts giving full description and prices, address "New Haven Manufacturing Co., New Haven, Conn."

ENGRAVING ON WOOD AND MECHANICAL DRAWING, by RICHARD TEN EYCK, Jr., 128 Fulton street, New York, Engraver to the Scientific American.

SAWS.—HOE & CO.'S PATENT GROUND SAWS Plastering Trowels, &c., can be had, wholesale and retail, at the principal hardware stores, at the salesrooms of the manufacturers, 29 and 31 Gold street, or at the works corner of Broome, Sheriff and Columbia sts., New York. Illustrated catalogues, containing prices and information interesting to sawyers generally, will be sent by post on application.

CLOCKS.—TOWN CLOCKS OF ALL SIZES also Regulators for Jewelers, Railroad Offices, &c. believed equal to any made. Dials for illumination. VOSBURGH & CO., Agents. 122 Liberty street, New York. JOHN SHERRY, Manufacturer, Sag Harbor, N. Y.

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WANTED—A SITUATION BY AN EXPERIenced Pattern Maker, who understands mechanical drawing. Address R. E. S., Louisville, Ky.

AGENTS WANTED IN ALL THE CITIES and towns throughout the United States, to sell Wright's Patent Sectional Spring Bed Bottom. Address W. WRIGHT, No. 102 West Fortieth street, New York City.

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N. B.—Reliable orders filled for any part of the United States and Europe.

EXCELSIOR STEAM PUMPS, DIRECT and Double-Acting, manufactured and sold at 55 and 57 First st., Williamsburgh, N. Y., and 301 Pearl st., New York. May be seen in operation at J. O. Morse & Co., 79 John st., New York.
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ALCOTT'S CONCENTRIC LATHE—THIS Lathe is capable of turning under 2 inches in diameter with only the trouble of changing the dies and patterns to the size wanted. It will turn smooth over swells or depressions of ¾ to the inch, and works as smoothly as on a straight line, and does excellent work. Price $25, (without frames,) boxed, and shipped with directions for setting up. For sale by MUNN & CO., 128 Fulton street, New York City.

STEAM ENGINES, STEAM BOILERS, Steam Pumps, Saw and Grist Mills, Marble Mills, Rice Mills, Quartz Mills for gold quartz, Sugar Mills, Water Wheels, Shafting and Pulleys. The largest assortment of the above in the country, kept constantly on hand by WM. BURDON, 102 Front street, Brooklyn, N. Y.

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WOODWORTH'S PATENT PLANING MACHINES, of every kind and all prices. A large assortment on hand; and I am prepared to construct any machine to order, from ten days to two weeks, and guarantee each machine to be perfect in its construction, and give purchasers entire satisfaction. The patent has expired, and will not be renewed. I make this business exclusive, manufacturing nothing but the Woodworth Machines, and for that reason can make a better article for less money; and with my fifteen years' experience I fully guarantee each machine to come up to what I am willing to recommend, that is, that each machine shall be more than equal to any other manufactured for the same price. JOHN H. LESTER, 57 Pearl street, Brooklyn, N. Y., three blocks above Fulton Ferry.

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Science and Art.

Heat in the Water of Pumps.

MESSRS. EDITORS—At the close of an article upon heat and cold in your issue of October 31st, you express a desire to hear more upon the subject of heating water by friction, which has called out an article from Joseph E. Holmes, Esq., and the result at which he arrives for observing the action of the Gwynne pump (and in which you appear to coincide) is that owing to a large suction pipe being used, and the water forced through a smaller opening, a compression of the particles of air contained in the water ensues, that results in evolving heat, which, being taken up by the water, raises its temperature. My experience leads me to a different opinion. I have had running, during the late Fair of the American Institute, several centrifugal pumps; one had a suction pipe of 5 inches diameter, with a discharge 2¾ inches, through which, at an elevation of some 3 feet, 750 gallons of water per minute were forced; and the pump was kept running during the whole time the Fair was kept open, whenever the engines were operating, pumping the same water without change from first to last, except to replace the loss from evaporation, and at no time did the temperature approach blood heat, though perceptibly hightened after several hours' constant running. I had also another pump, with a 9-inch suction, and 6-inch discharge pipe, elevating its water about 5 feet, and discharging 3,000 gallons per minute, running for three weeks, under the same circumstances as the first, which did not raise the temperature to the same extent, although the whole quantity of water used was less, in proportion to the quantity discharged, than in the first instance. These facts, in my opinion, would show that the increased heat was due to the increased friction of small pipes.

I account for the different results in Mr. Holmes' experience and my own as follows:—The discharge pipe, in the case he instances, being smaller, and discharging about the same proportionate quantity, caused an increased friction, and the angles at which the water passes through the Gwynne pump causes a large increase of friction—there being no angles in my passages, the water being passed around curves, which become easier as the size of the pump is enlarged. To these causes may, perhaps, be added, as you suggest, an increase of temperature from the friction of the parts of the pump, as I find, by the manufacturers' published tables, that to raise water 15 feet with the Gwynne pump, through a 4 inch suction, and 2½-inch discharge pipe, at the rate of 100 gallons per minute, requires a velocity at the periphery of the rotating wheel of 3,750 feet per minute; while with a 3-inch suction and 2-inch discharge pipe, my pump discharges 75 gallons per minute, 17 feet high, with the periphery of the wheel running less than 2,000 feet per minute. I should be pleased to hear the opinion of yourselves, or some of your scientific correspondents, upon the facts as stated. W. D. ANDREWS.

New York, November 27, 1857.

[The fact seems to be established, that the water which passes through centrifugal pumps is elevated in temperature. What is the cause of this? is the question. The water in these pumps, it seems, is not compressed, but is driven at a high velocity. If the air in the water is not compressed, then the rise in temperature cannot be due to this cause. Is it due to the friction of water on the metal? This idea is opposed to that hitherto entertained respecting the friction of fluids on solids. There is no question respecting the fact that the friction of the solid parts of these pumps generates frictional heat, which must be carried off by the water; but Mr. Andrews is of opinion that the friction of the water on the metal also generates heat. This is an interesting point, or rather question; for if it be established that the friction of fluids on solids generates heat, then the temperature of the water discharged by such pumps will afford a very good test of their efficiency, as the one which raises the temperature of the water highest must require the greatest amount of power to operate, and thus be the least effective.—EDS.

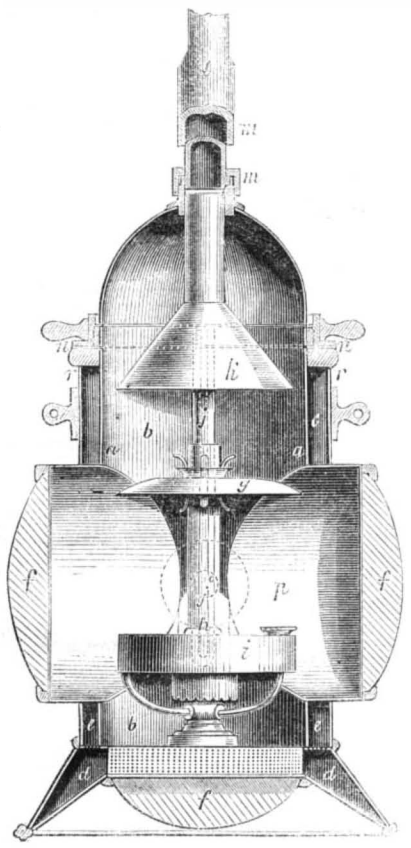
Apparatus for Illuminating Objects under Water.

The *London Engineer* publishes a description of a lamp for this purpose, invented by Mr. Heinke, of London, a gentleman well known in connection with diving apparatuses.

This invention consists firstly, in an improved mode of supplying the lamps with air and also of carrying off the products of combustion; and, secondly, in adapting to such lamps reflectors, condensers, or lenses, which throw the light with great intensity in the direction required.

The first of these objects is effected by placing the lamp (which may be of any suitable construction, provided it gives a considerable amount of light) within a double cylindrical or other conveniently shaped casing, which is provided with an annular chamber or space, formed by piacing one casing of smaller diameter within another of larger diameter, leaving an annular space.

The illustration shows a vertical section of the lamp. It is preferred to make the casing or body of sheet copper, and it is composed of two cylinders, *a* and *r*, placed concentrically,

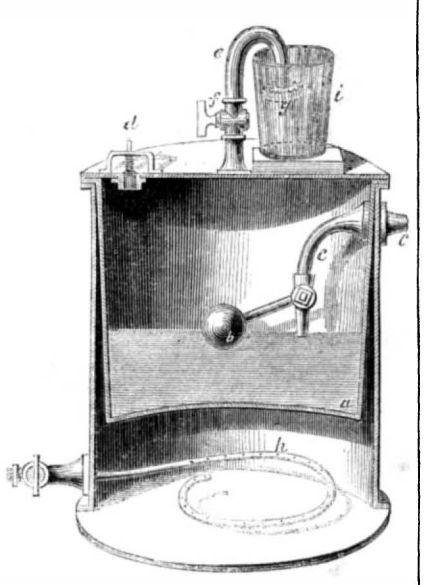


one within the other, so as to leave an annular space, *c*, between them. The foot of the lamp is composed of the same material, and is also made hollow; as at *d*, *d*. The internal part of the hollow foot is perforated with small holes, *e*, *e*, for the purpose of admitting air from the annular space, *c*, to the interior of the lamp. The casing has any convenient number of condensing lenses fitted to suitable openings made in the casing, as shown at *f*, *f*, *f*; and if required, reflectors may be adapted in such a manner to the lamp as to throw the light through the condensing lenses.

It will be seen that there are two lenses, *f*, *f*, adapted to the sides of the casing, for the purpose of throwing the light forward in a horizontal direction. There is also another condensing lens, *f*, adapted to the foot of the apparatus, and above the light is placed a horizontal metal reflector, *g*, which will throw the light down through the condensing lens, and thereby cast a brilliant light on anything below. The lamp, *h*, is of the ordinary argand kind, and is supplied with oil from the resevoir, *i*, which is made of an annular form, for the purpose of allowing the light from the flame of the lamp to pass through to the condensing lens, *f*, below. The lamp is secured in vertical slotted guides, *j*, *j*, fixed to the sides of the casing; it is of course provided with a glass chimney for the purpose of steadying the flame, and the reflector, *g*, is placed on this glass chimney, and may be secured at any suitable altitude by means of spring clips, as is well understood. The gaseous products of combustion pass up the glass chimney from the flame in to the trumpet-mouth, *k*, of the vertical tube, which communicates with the hose or flexible pipe, *t*, above, the connection between the two pipes being effected by means of a screw joint at the top of the dome cover of the apparatus, as seen at *m*. This cover is screwed on to the top of the apparatus, a leather or other washer, *n*, being placed on the flange, by which the two parts are united. Air to support combustion is supplied to the lamp down the flexible tube or hose, which is adapted to a short conical branch pipe secured to the sides of the casing and made to communicate with the annular space between the inner and outer casings. The two circles of this branch pipe, *p*, *o*, are dotted in the figure, being in front of the lamp. The apparatus is suspended by means of cords or chains.

Apparatus for Heating Fluids.

This invention consists in an improved apparatus for heating wine, beer, spirits, &c. The illustration represents a section of the improved apparatus. *a* is the boiler, which is made sufficiently strong to resist the pressure of the steam generated therein; *b* is a tap and float to regulate the quantity of water admitted to the boiler by the supply pipe, *c*; *d* is a small safety valve connected to the lid of the boiler to allow the steam to blow off when the



pressure becomes too great; *e* is a tube to convey the steam from the boiler, *a*, into the fluid to be heated; *f* is a tap in the tube, *e*; and *g* is a rose at the end of the tube to distribute the steam in the fluid to be heated; *h* is a circle of gas jets for heating the water in the boiler. The patentee prefers to use gas for heating the water in the boiler in apparatuses of small dimensions. In some cases the boiler may be placed in another apartment, and heated by coal or otherwise; the tube, *e*, would then be conveyed to the table or counter where it is required. The fluid to be heated is placed in a glass or other vessel, as shown at *i*, and the steam is admitted by turning the tap, *f*; the steam imparts its heat to the fluid, and becomes condensed immediately on entering it. By this apparatus wine and beer may be mulled, and spirits and water heated in a very short time and with the greatest cleanliness.

We copy the above from the *London Engineer*.

The Victoria Tubular Bridge.

The first tube of this bridge over the St. Lawrence river, at the Montreal side, has just been placed in position. It weighs, we understand, nearly one thousand tuns, and when left to support itself was only deflected about one and a half inches. Calculations were made for a deflection of four inches, but the small depression is proof of its great strength. When finished, this will be the most gigantic structure of the kind in the world.

Paper Impervious to Water.

Take 24 oz. of alum, and 4 oz. of white soap, and dissolve them in 2 lbs. of water; into another vessel dissolve 2 oz. of gum arabic, and 6 oz. of glue in the same quantity of water as the former, and add the two solutions together, which is now to be kept warm, and the paper intended to be made water-proof dipped into it, passed between rollers, and dried; or without the use of rollers, the paper may be suspended until it is perfectly dripped, and then dried. The alum, soap, glue and gum form a kind of artificial leather, which protects the surface of the paper from the action of water, and also renders it somewhat fire-proof. This is a preparation for water-proofing paper intended for packages exposed to the weather, recommended by Professor Muschamp, of Wurtemburg, Germany.

Instinct.

This principle, common to all animals, is the spontaneous impulse by which they perform certain actions. Under this term should be distinguished the *instinctive faculty*, which leads the duckling, untaught, into the water, and the chicken, equally untaught, to avoid the water; the bird to fly, a child to try to walk; and the *instinctive motion*, such as the involuntary action of the muscles, as in laughter for pleasure, tears for grief, the act of swallowing, and the methods of locomotion in the various forms of animal life.

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